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The Telephone Engineer.

In another portion of this issue we print a paper on "Telephone Engineering," read by Mr. J. J. Carty before the New York Electrical Society. This paper will repay careful perusal by all electrical engineers. Some of our contemporaries have recently been discussing the vexed question: "What is an electrical engineer?" and an objection has been put forward that the telephonist has no claim to be considered an engineer, because he is not called upon to handle large masses of material or heavy machinery.

We have been considering the advisability of combating this view, and Mr. Carty's paper affords an excellent peg—in fact, a whole row of pegs—on which to hang a few remarks. As regards the handling of heavy bodies, a couple of hundred lead-encased underground cables are no light matter, especially when they have to be taken to the top floor of an eight-story building and so disposed that it shall be possible to draw any of them out and substitute new ones. Again, a switchboard weighing 55 tons is calculated to inspire respect in the mind of any engineer, and we doubt if 55 tons of any other mechanical or electrical apparatus, connected in one harmonious whole, contains one-tithe of the beautiful contrivances, or intricate yet systematic disposition of parts, such as those embodied in the multiple switchboard. As Mr. Carty very truly says, there is nothing equal to it outside of the human body, and fancy a human body weighing 55 tons!

Both in underground and overhead construction, the telephonist meets with difficulties of every description, and surely it is no misapplication of the term "engineering" as a description of the means and methods by which these difficulties are surmounted and overcome. True, there is a tendency on the part of many to get round difficulties rather than to triumph over them in a legitimate manner; that the art of telephony has reached such a high pitch in this country, is proof that those engaged in its advancement do not stoop to such devices, but by their adherence to scientific principles and their fertility of resource in devising new methods where old practices are tried and found wanting, we consider that they fully establish their claim to the title of "telephone engineer."

The electric light or motor engineer is content to know very little of the inside working of the telephone, and indeed he has not much opportunity to extend his knowledge very far in that direction; probably he considers that the telephonist is just as much a stranger among the dynamos, converters, motors and trolley wires. If he does, he is very much mistaken. The telephone engineer hears a good deal about electric lighting and traction by induction, and he is always striving to hear less. In the exchange he has alternate current generators to ring subscribers' bells, and electric motors to run the generators, and they all require looking after. In the transmitter and repeating coil he has converters, offering problems as complex, and capable of as much development as those used in electric lighting. The telephone engineer has to be always at work on devices to protect both ends of his lines from the ravages of vagrant strong currents.

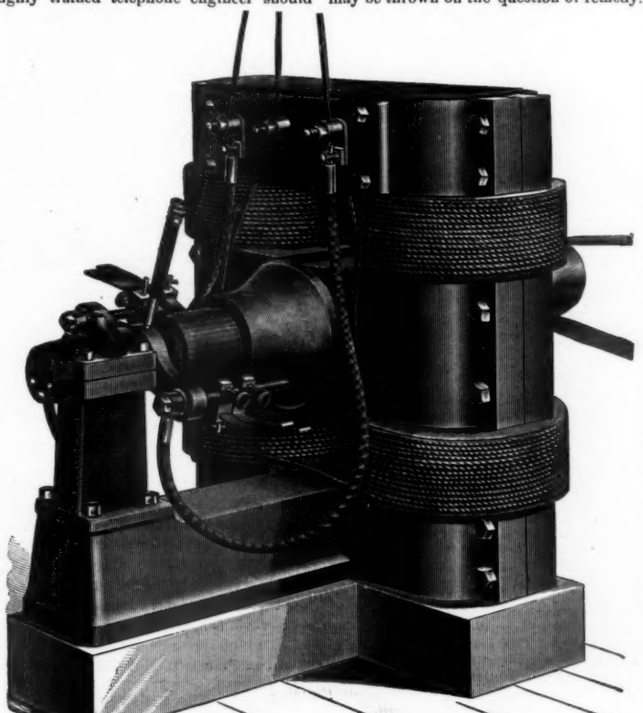
Apart from grappling with such questions as these the telephone expert has to be a good deal of a student in other directions. Of the mysteries of electro-static induction he can never learn too much. He should even extend his studies beyond matters merely electrical. As Mr. Carty points out, there are beautiful analogies between the telephone system and the most delicate parts of the human body, and some of his suggestions would well repay further investigation, alike by the physiologist and the electrician. With acoustics, too, the telephonist cannot make himself too familiar. Most assuredly a thorough knowledge of this science will help him vastly in dealing with and understanding some of the perplexing physical features of telephony.

We might extend the list of what a thoroughly trained telephone engineer should know almost indefinitely (and in touching on the more important branches, we have quite omitted some of the minor ones, such as the primary battery question, testing underground cables, and designing or adapting magneto-bells), but we think enough appears in our columns to-day, to convince the most skeptical that telephony offers a field for the best and highest order of ability, and at the same time it is a field in which none but those endowed with perseverance and versatility can hope to excel. Telephone engineering is emphatically a young man's vocation; it is scarcely more than an infant itself, and is not to be learned from text books or in college lecture rooms. Innovations are being introduced every day, and only actual contact with the work can familiarize the student with what he needs to learn.

Book Notices.

S. H. Parvin's Sons, Newspaper Advertising Agency, Cincinnati, have sent out a revised list of class and trade papers. Journals in the electrical field are not numerous but they are good—quality, not quantity. The list gives valuable information to intending advertisers, presenting estimates of the circulation, the size of page, including width and length of columns and the number of columns per page. People interested will do well to obtain one of these lists from Messrs. Parvin.

President Seth Low (ex-Mayor of Brooklyn), in his article on "The Rights of the Citizen as a User of Public Conveyances," in the June *Scribner's*, says: "The most valuable city franchises in the United States have been parted with, for the most part, for nothing. In Europe they have been largely retained as a source of revenue to the community. If we can find the reason for the facts as they exist here, much light may be thrown on the question of remedy."



Forbe Bain's Dynamo.

A New Dynamo.

The illustration on this page is that of the new dynamo invented by the prominent electrical engineer of Chicago, Mr. Forbe Bain. Handsome in design and solidly built, the dynamo has every appearance of being a most efficient machine. We have not received the data of the work of the machine, and will give them to our readers in a subsequent issue.

Fire at Taunton, Mass.

Advices from the above named city, under date of May 14, state: "The burning of our electric light station recently is not anywhere near as serious a matter as some daily papers would have it appear. Two of the six dynamos are uninjured and the remainder are very little damaged, and we expect to have them running in a few days."

Capt. Zalinski in Europe.

The following cable despatch from Berlin to the New York *Sun*, will interest all the members of the Electric Club, of this city, of which the talented Captain is a popular member:

"Capt. E. L. Zalinski, the perfecter if not the inventor of the dynamite gun, has completed his study of European military arrangements, and will sail for New York from Hamburg, on May 22. He has, under orders from our War Department, spent a year abroad making reports upon what he has seen in England, Spain, Italy, Switzerland, France, Belgium, Holland, Sweden, Denmark, Russia, and, above all, Germany. He has gained access to establishments jealously guarded from ordinary military attachés, has worn out the physical and mental endurance of all the officers detailed by the government to watch over him, and has shown a restless energy in the study of details affecting the soldiers' comfort and efficiency in the field, that must prove of great value to us if his letters are not all pigeon-holed. It is not too much to say that Zalinski has seen more of soldier life in Europe than all the rest of our military attachés put together, and has done so because his previous record in our civil war has made him a welcome guest in quarters where a newly fledged graduate from West Point would have been treated as an intruder. Most of our military representatives here are not only very young and very inexperienced in the handling of troops, but lack the knowledge of languages that is essential to conversation with European officers. Zalinski knows to-day far more of the secrets that make Germany the first of military nations than any one else, because German officers are pleased to meet one who has seen actual war, and has distinguished himself scientifically as well."

The Men Who Succeed.

The men who succeed in business in this day are not ordinary men. In fact, no ordinary man can succeed; the time has gone by for this. General knowledge is more comprehensive and universal than at any period of human history; the masses of men are better educated, and if not educated, they are better informed by reading and observation. So it is that business men know more, have a broader knowledge and intelligence, and are, consequently, shrewder and more enterprising. Compared with the business men of any former period, the merchants of to-day are far from ordinary men in their field of effort in life. And each day is making the field wider and increasing the number of the necessary qualifications for success in it. Why, the salesman of the present day, no matter in what line or where you find him, is a man of bright, quick understanding, such as entitles him to rank with the energetic and successful men of any class. Then when you come to a man who has large capital invested and who must foresee, plan and direct in regard to the interests of a great house from season to season, you behold an individual, who in this day must be brave, calm and far-sighted, to succeed at all. A business man in the vortex of trade is not a mere seeker of a living or a fortune, but he is necessarily a man of intelligence, which elevates him to the rank of those who succeeded by mind and energy. —*Second Century.*

Youngstown, Ohio, is to adopt the Westinghouse alternate current incandescent system. Work begins at once.

Our Census of Manufactures.

On the 2d day of June the work of collecting statistics of manufactures for the report of the Eleventh Census will be inaugurated throughout the entire country. The value of this report must depend wholly upon the accuracy and thoroughness with which manufacturers answer the questions propounded.

The personal interests of every manufacturer are involved in the character of the report on manufactures. It will be quoted for the next ten years as the official announcement of the *exact* industrial condition of the country, and will be the basis for any future legislation that may be enacted in regard to the wants of our people, whether engaged in agricultural or mechanical pursuits. Therefore, it is of vital importance to each manufacturer that an accurate report shall be made.

The Superintendent of Census has taken every possible precaution in the preliminary work to make this census complete and satisfactory, and the earnest co-operation of those engaged in productive industry is all that is now necessary to secure valuable results.

Every manufacturer should bear in mind that his answers to the questions relating to his business are held strictly confidential, are not disclosed to any competitor or to other persons, and are not used by the government as predicate for the purposes of taxation or license, or in any way to adversely affect his individual business. This assurance is printed on each schedule over the signature of the Superintendent of Census.

The expert special agent in charge of this branch of census work, Mr. Frank R. Williams, has personally visited the principal manufacturing centers and consulted representative manufacturers, the publishers of trade journals, and practical business men generally, for the purpose of ascertaining the proper scope of the inquiry for each branch of manufacture. The questions contained in the census schedules are those suggested by the manufacturers and other persons most interested in the progress of the country, and cover ground absolutely essential to the proper presentation of its industrial conditions and resources.

Electric Railway at Birmingham.

Nothing is more indicative of the rapid growth and development of the South than the manner in which the towns and cities in that part of the Union are adopting electricity for illuminating purposes as well as for operating all kinds of machinery. The street car service is also undergoing a revolution or transformation in that section at a rapid rate, and the time is not far distant when the Southern mules—with all their mulish tricks and vices—will be relegated to other service than that of hauling street cars through the handsome cities and prosperous towns now springing up in every Southern State.

Among the most prominent cities which nature appears to have specially designed, by reason of its fine geographical position and almost illimitable mineral resources, to speedily become the metropolis of the Sunny South, is Birmingham, Ala., the citizens of which are as full of sand as the citizens of the great English town of Birmingham, the metropolis of the Midlands, after which it is named. The rate at which this Southern city is growing is simply phenomenal; and within the last few days there has been commenced there an undertaking surpassing anything of the kind ever before attempted, and placing Birmingham in the front rank of American cities. This is the consolidation of the Birmingham and Bessemer Railway Company, the Ensley Railway Company, the East Lake Railway Company and the Union Railway Company, under the title of the Birmingham Railway and Electric Company, which company will now operate from 60 to 100 miles of road, the entire length of which will be equipped with electricity. This equipment will necessitate an outlay of well nigh $2,000,000, and the contract for the entire undertaking has been placed with the Thomson-Houston Electric Company.

The consummation of this undertaking is due to the enterprise and fine business capacity of Mr. T. T. Hillman, one of the most popular and successful men in the South, who, in this great undertaking, has associated with him some of the strongest men of Birmingham. This gentleman owns rich coal and iron interests, and may be considered one of the commercial leaders; he is also a self-made man, and stands deservedly high in business circles.

Mr. Hillman has been elected president of the newly consolidated company, and Mr. Robert Jennison, manager. The company will at once place contracts for rails, car bodies, engines and boilers for the central power station, which is to be equipped with a steam plant of 2,500 horse-power capacity. The overhead construction will be adopted, the center iron pole being used for supporting the conductors.

This consolidation, and the placing of the contract with the Thomson-Houston Electric Company, has created quite a breeze in many parts of the South, and already its effect is being felt among prospective settlers. The undertaking is considered by representative men to be fraught with good for the entire South.

The Sims-Edison Torpedo.

Several of the delegates to the Pan-American Congress, together with a lot of army and navy officers and others, went down to Willett's Point, on May 2d, as the guests of President Everett Frazer and other officers of the Sims-Edison Torpedo Company.

The event of the day was the operation of one of the Sims-Edison electric torpedoes. The lower part of the torpedo is cylindrical, with sharp ends, and it contains the explosive substance. The upper part is a float from which the lower part is suspended six feet below the surface of the water. The torpedo used was loaded with an amount of gravel equivalent to 265 pounds of dynamite. It was towed out a short distance from the wharf, and was then propelled from shore by electricity under the direction of the inventor, W. Scott Sims, on the wharf. The course was northerly for one-fourth of a mile, and then westerly, returning past Fort Schuyler, until it was brought to a standstill about 800 feet from where it started. Its velocity was at the rate of 19 miles an hour. The inventor received the congratulations of the party. The actual amount of space traversed was about 4,500 feet, and the time consumed was 1 minute and 45 seconds.

The Copper Syndicate.

The trial of the directors of the Société des Metaux was opened at Paris, May 6. All are charged with paying fictitious dividends. M. Secretan is further accused of illegal forestallment of merchandise. In the course of his examination, M. Secretan protested against the charges, and appealed to his life of honorable work as a refutation of the charges. He said that he had not wished to speculate, but to achieve a work of patriotism. "We desired," he said, "to create in France a market not previously in existence, in order to be no longer at the mercy of speculators in the English market."

At a meeting of the South Framingham, Mass., selectmen, last week, a franchise was granted to the Framingham Electric Street Railway Company, to build a line from Natick to Ashland, through South Framingham.

"Pollock Telegraphica."

To the Editor of Electrical Review:

While turning over the leaves of the dictionary, a few evenings ago, in quest of the elixir of life, my curiosity was suddenly aroused by the following paragraph:

Pollock, *n.* An edible fish of the Atlantic coasts, distinguished from the whiting by having a projecting under jaw.

It struck me at once as sadly incomplete, in the light of a recent discovery.

There is a species of Pollock found in New England—the *P. telegraphica*, which is *not* edible. It is a very vigorous specimen, susceptible of amazing rapidity of motion, and belongs to the genus *gymnoti*. The *gymnotus electricus*, when full grown, will (according to Wood) attain a length of five or six feet. (The one in question is about that length.) Like the *gymnoti*, *Pollock telegraphica* "calls forth all the terrors of his invisible artillery to repel intruders, and discharges his pent-up lightnings with fearful rapidity. Gliding under the bellies of horses (particularly *plugs*), he presses himself against their bodies as if to economize all of the electric fluid, and by shock after shock, generally succeeds in drowning several of the poor creatures."

This is what quite recently happened in New York. The apparently innocuous Pollock was transferred from the Hartford aquarium to the pool in Hardman Hall, and then the terrible scene just quoted from Wood's Natural History was re-enacted, only not a single victim escaped. How "fearfully yet wonderfully made!" The *P. telegraphica* is of exceeding rarity, this being the only authenticated proof of its previous existence. Its chief article of food is the click beetle, and it nibbles only at telegraph lines. Amandus.

San Francisco, May 5, 1890.

The Redondo Hotel.

At Los Angeles, Cal., the Redondo Hotel was opened last week. Messrs. Rhodes & Keese, agents for the Thomson-Houston Company, furnished the arc and incandescent electric light plant. This consists of two dynamos, one for the hotel and the other for the arc lights used for illuminating the wharf and grounds. That for the hotel is one of 800 incandescent lights of 16 candle-power each, making a total illuminating power equal to 12,800 candles. Fifteen arc lights are run from a Thomson-Houston arc machine.

At the annual meeting of the stockholders of the River and Rail Electric Company, in Brooklyn, last week, the following board of directors was elected to serve for the ensuing year: S. B. Chittenden, Michael Chauncey, A. C. Barnes, E. Ellery, H. L. Fillebrown, George E. Ide, C. E. Bigelow, W. H. Phelps, William Main, George L. Wright, E. J. Horton.

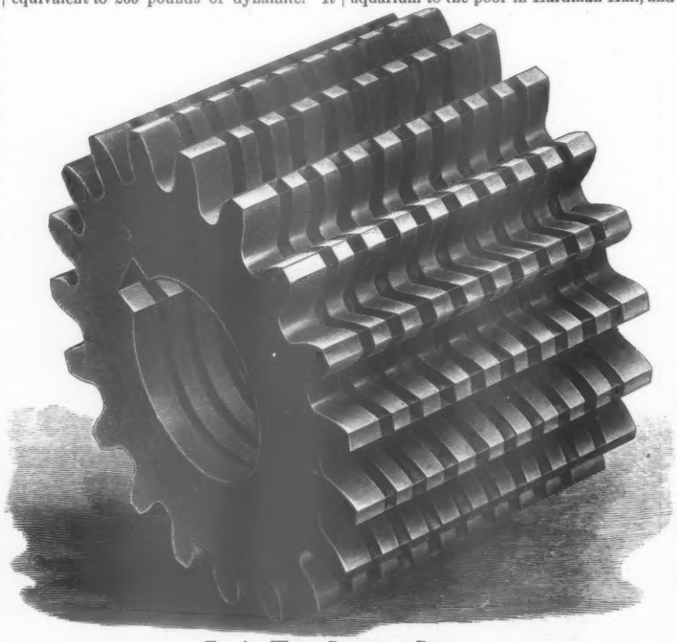


Fig. 1.—Wave Composite Pinion.

The Wave Composite Pinion.

Mr. J. C. Chamberlain, of this city, has recently been granted letters patent on a composite pinion which possesses novel features. The invention relates to improvements in composite pinions which are composed of alternate layers of metal or other hard material and rawhide, or comparatively soft or non-resonant metal. The pinion engages with an ordinary or all-metal gear wheel.

Heretofore the plates composing the pinion have been placed in planes at right angles to the axis of rotation of the pinion. With such a construction, the wear on the all-metal gear wheel being confined almost wholly to the parts opposite the metal layers of the composite pinion, circumferential grooves were in time worn at those parts, leaving interposed ridges at the parts opposite the rawhide. The wear being thus confined to a portion only of the all-metal wheel, its working life is considerably shorter than would be the case were the wear equally distributed. Besides this, as the composite gear is in practice a comparatively small pinion, it wears away much faster than the all-metal wheel, and has to be replaced more frequently. When a new composite pinion is put into engagement with an all-metal wheel in which grooves have been worn, the grinding on both wheels due to this grooved surface is very destructive; the more so as the plates of the new pinion will not generally correspond with the grooves or ridges in the all-metal wheel.

The object of Mr. Chamberlain's invention is to distribute the wear equally over the working face of the all-metal wheel, thereby lengthening the working life of the wheel, and maintaining it in a noiseless condition for a longer time, and also maintaining it in condition to properly engage with a new pinion. To accomplish this result the alternate layers of metal and rawhide, of which the pinion is composed, are placed at a slight angle or cant to the axis of the wheel, so that the metal portions, in bearing on the all-metal wheel, travel laterally upon the same by a worm-like motion, so as to distribute the wear. Another object of the invention is to prevent the rawhide plates of the pinion from slipping when clamped between the metal plates.

Fig. 1 shows a perspective view of the pinion. An old style pinion and gear having run about 18,000 miles is illustrated in Fig. 2. Fig. 3 shows a pinion and gear which have seen about 2,000 miles of service, built under these patents. An axial section of the wave composite pinion is illustrated in Fig. 4. A section, showing in dotted lines the plates after making a half revolution, is shown in Fig. 5.

This pinion seems to fill a long-felt want for a wheel which is comparatively noiseless, and having at the same time long life and good wearing qualities.

Cool Air in Theatres.

Mr. Theodore Moss, proprietor of the Star Theatre, has purchased of the Crocker-Wheeler Motor Company, of this city, a plant for use in chilling the air in the auditorium of the theatre. The plant consists of a large Crocker-Wheeler motor, a pressure blower, a large ice chamber, ducts leading into the auditorium, and registers for controlling the flow of air.

One of the peculiarities of the system is the construction of the ice chamber, which is so arranged that the drippings of the water from the ice are utilized to cool the air before it comes in contact with the ice itself.

Several small fan motors are also included in the system. It is claimed that a temperature 15 degrees below that of the outside air can be maintained by this means. A trial of the plant, on May 12th, was successful.

The armature for the 250 horse-power multipolar dynamo for the West End road, is in process of finishing at the Thomson-Houston Company's Lynn works. It is the largest machine in the country of the kind, the core being 42 inches in diameter.

The First Eggs Cooked by Electricity. —Long-Lived Incandescent Lamps.

To the Editor of Electrical Review:

Upon page 3, of your issue of May 10th, is an extract from Cincinnati *Times-Star*, about the first egg boiled by electricity.

The fact is—and it has been put on record in your paper a year ago or more—in 1882 Mr. Thomas Pray, Jr., then and now of Boston, cooked the first four eggs boiled in water by electricity, the first piece of beefsteak, and probably the first bacon, in the city of Richmond, Virginia, while he was acting with his then and now friend, Dr. W Leigh Burton, of "Burton Heater." Cincinnati is, therefore, eight years late to claim the first cooking by electricity. The eggs then cooked were eaten at dinner the same day at Dr. Burton's house in Richmond.

On the same page you notice one long-lived lamp. Some lamps made by Mr. Pray, put into a cotton mill in July, 1888, were sound and not discolored on May 1st, 1890. The mill runs 134 hours per week, and several lamps are now running of the same lot —making over 5,200 hours for each one— all 16 candle-power, as the writer has seen the agent's letter as above.

An Occasional Review-er.

Boston, May 10.

Poles on Sidewalks.

An important decision was recently rendered in the Baltimore Common Pleas Court, by Judge Duffy, affecting the right of telegraph and telephone companies to erect poles on sidewalks and pavements. The decision was upon a demurrer to the plea of defendant in the suit of Mrs. Lucy T. Mackenzie against the Chesapeake and Potomac Telephone Co. Mrs. Mackenzie is the owner of certain property on South Charles street, near German. One night, about a year ago, the Chesapeake and Potomac Telephone Company planted a pole measuring two feet or more in diameter upon her pavement. The company was notified to remove the pole and refused to comply with the demand. On April 29, 1889, Mrs. Mackenzie entered suit in the Common Pleas Court, through Lawyers John V. L. Findlay and Thomas Mackenzie, for $3,000 damages. The corporation filed pleas—first, setting up the defence that under the act of the Assembly, under which they were incorporated, they had a right to plant poles along the public highways and were not liable to damages therefor, and, secondly, under the ordinances of the Mayor and City Council, their poles could remain upon property for a period of two years, until their wires could be placed underground. Findlay & Mackenzie filed a demurrer to these pleas, and in his decision Judge Duffy sustained it, holding that while the company had the right to plant poles along the footways and pavements, yet if the pole interfered with the free use of the premises, although the injury was unavoidable, the company is liable for such damages as the property owner can show he has sustained, and he has a right to bring an action against the company. Judge Duffy also held that the act of Assembly does not and cannot take away this right, and, as the ordinance of the Mayor and Common Council could not be of higher authority than the act of Assembly, it could not grant the telephone company exemption from damages.

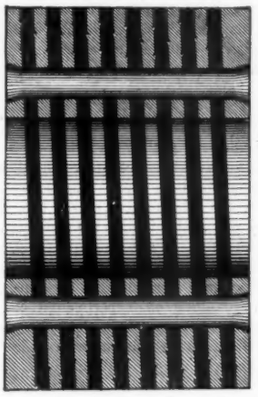


Fig. 4.—Axial Section, Wave Composite Pinion.

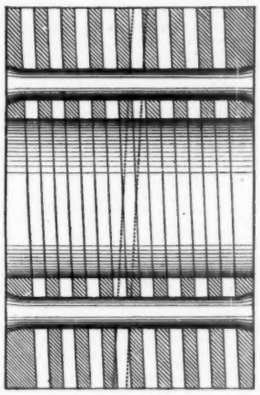


Fig. 5.—Section, Wave Composite Pinion.

Fig. 2.—Old Style Pinion and Gear.

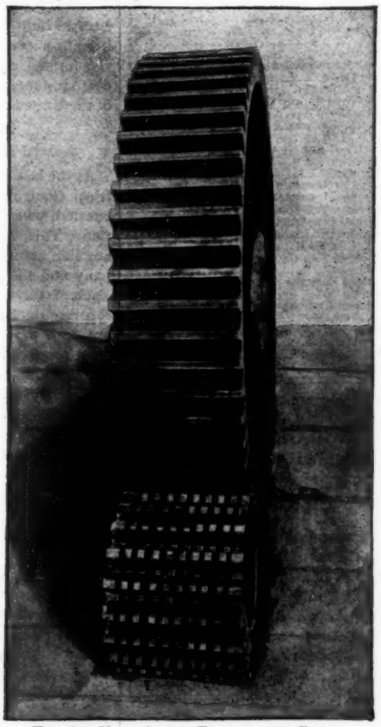


Fig. 3.—New Style Pinion and Gear.

Little Rock, Ark.—The Dewitt Improvement Company; capital, $75,000; object, to operate arc and incandescent lights, street railroads, telephones, etc. Officers are, Thomas H. Leslie, president, and James A. Gibson, secretary.

Milford, Mass.—The Milford and Hopedale Street Railway Company; with a capital stock of $60,000; president, E. P. Usher, of Grafton; secretary, F. W. Morse, of Grafton; directors, E. P. Usher, F. W. Morse, Gen. W. F. Draper, of Manchester.

Kansas City, Mo.—Southwestern Electric Light and Water Power Company, Kansas City and Joplin; incorporators; Edward L. Martin, Arthur E. Stillwell, M. C. Curtis, Theodore Fox, Robert B. Cone, William S. Taylor.

Butler, Pa.—Butler Traction Company; to build an electric railroad in the town of Butler. The capital stock is $18,000. The stockholders are John S. Craig and Theo. Sproull, Allegheny; Wm. F. Lloyd and W. J. Crawford, Pittsburgh; Andrew G. Williams, John H. Sutton and David Osborne, Butler.

Holyoke, Mass.—A new concern has been organized in this city under the title of the Holyoke Electric Co. The capital stock is $10,000 and the number of shares 100, value of each share, $100. The directors are F. A. Wyman, president, and A. S. Palfrey, treasurer. The company is organized for the purpose of generating, distributing and selling electricity for light, heat and power, supplying the same to the inhabitants of Holyoke, and also doing a general electric light, heat and power business.

Chillicothe, O.—Juneman Electric Light and Power Company; capital, $50,000.

Cincinnati, Ohio.—Cincinnati Edison Electric Light Company; capital, $1,000,000.

Mansfield, O.—The Mansfield Electric Light and Power Company; increase of capital stock from $25,000 to $50,000.

Troy, N. Y.—National Electric Manufacturing and Construction Company, the capital is $50,000. The trustees are: Edward F. Murray, Z. Latshaw and David Morey.

Denver, Col.—Denver Portable Electric Light and Power Company, with a capital stock of $1,500,000. The directors are: Henry R. Wolcott, Melvin Edwards, Theodore H. Thomas, Isaac E. Blake, H. B. Chamberlin, C. L. McIntosh and Thornton H. Thomas.

Austin, Texas.—The Waxahachie Electric Light Company; capital, $20,000.

Philadelphia, Pa.—The Powelton Electric Company; capital stock, $10,000.

Blairsville, Pa.—Citizens' Heat, Light and Power Company; capital, $16,000.

Cincinnati, O.—Novelty Electrical Supply Manufacturing Company; capital, $10,000.

Tacoma, Wash.—The Tacoma Electric Company; capital stock, $25,000; trustees, L. G. Bigelow, A. C. Balch.

Crown Point, Ind.—The Crown Point Electric Light and Electric Street Railway Company; capital stock, $200,000.

Bonham, Tex.—The Bonham Electric Light and Power Company has increased its capital stock from $20,000 to $50,000.

Elgin, Ill.—Elgin Light and Power Company; capital stock, $1,000,000; incorporators, C. Towner, William Fay, E. Hagelow.

Oregon, Ill.—The Oregon Electric Light Company; to furnish light, heat and power; capital stock, $5,000; incorporators, F. G Jones, P. E. Hastings and J. C. Fester.

Chicago, Ill.—State Phonograph Company, of Illinois; to deal in phonographs capital stock, $250,000; incorporators, E. L. Lobdell, G. Farwell, E. H. Pearson.

Chicago, Ill.—Central Gas Improvement Company; to manufacture gas and electricity for illumination; capital stock, $150,000; incorporators, Calvin Dickey; G. M. Trowbridge, J. O. Morris.

Rock Hill, S. C.—The Rock Hill Electric Light Company; capital stock, $10,000; incorporators, W. Blackburn Wilson, Jr., David Hutchinson, W. L. Roddy, Richard T. Fewell and Alexander E. Smith.

Portland, Me.—New England Electrical Safety Company; capital stock, $100,000. President, Hiram Simmons; treasurer, Charles F. Atherton. Business, dealing in inventions for protecting electrical instruments.

Elizabeth, Pa.—The Elizabeth Electric Light, Heat and Power Company; capital, $10,000. The directors are: T. W. Martin, F. L. Bigham, P. T. B. Shaffer, J. J. Hill, G. W. Lutes and J. N. O'Neil, of Elizabeth, and L. E. Myers, Pittsburgh.

Seattle, Wash.—Northwest Electric Supply and Construction Company, to deal in electric supply goods, etc. Amount of capital stock, $75,000. W. J. Grambs, C. N. Haggins, J. E. S. Cain, Albert Bryan and A. R. Rinkney, are the incorporators.

Rockford, Ill.—The stockholders of the Rockford Electric Manufacturing Company met last week and decided to increase the board of directors from five to seven. C. A. Works and J. A. Johnson were elected. It was further decided to increase the capital stock to $100,000.

Alexandria, Va.—The American Electric Manufacturing Company has been chartered at Alexandria, Va., with a capital of $500,000 common, and $200,000 six per cent. preferred stock. The company will make telephones, construct, maintain and operate telegraph and telephone lines in North and South America, and will do all kinds of electrical business.

Boston, Mass.—Insurance Commissioner Merrill has issued a certificate to the Electric Mutual Insurance Company, of Boston, to insure against loss or damage, especially to property used in the manufacture of electric light and power. Stephen E. Barton, president; H. H. Fairbanks, treasurer, and Frederick A. Gilbert, Benjamin F. Peach, Jr., Theodore C. Bates, William Brophy and Everett W. Burdett, directors.

ELECTRICAL REVIEW

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"The world is mine," says the electrical railway man. And he is rapidly proving it. Electric power is rapidly disposing of the street car horse in all cities but New York.

In the *Revista Telegrafica de Mexico* there was recently published the text of an official telegram from the imperial commissioner of Yucatan to the emperor Maximilian. The message was dated at Merida, November 12, 1865, and congratulated the emperor, who was then on the eve of his downfall, on the opening of the first telegraph line established in Mexico. Since that time, the progress of our neighboring republic, alike in the way of extending telegraphic communication and in modern civilization generally, has been continuous and energetic; there are probably few countries that have developed so rapidly in a quarter of a century.

The Catholic cathedral at Strasburg has been for some time past lit by incandescent electric light. This is the first German church into which the Pope has permitted the introduction of the modern method of illumination. The effect is said to be magnificent, and serves to heighten the majesty and grandeur of the edifice, as we can well imagine. It is to be hoped, and it is confidently expected, that the example of Strasburg will be followed by other ecclesiastical authorities. It is not very long since that we heard of the introduction of the electric light into Roman Catholic churches in New York being forbidden by the archbishop, though it seems hard to understand the motive for such an injunction.

Mayor Grant says the subway situation in New York makes him "tired." We think our foolish young Mayor will be given a nice long rest as soon as his present term expires.

During the month of March, 64,062 telegrams were dispatched by the Belgian telephone administration for subscribers who telephoned these messages to "Central." These figures show that the accommodation is highly appreciated. Antwerp heads the list with 20,922 messages, and Brussels follows next with 10,788. We wonder how these statistics would compare with the same class of traffic in this country, if there are any statistics of the sort made up here at all, that is.

It looks now as if the West End Company were going to put in practice their pet project and give Boston an elevated railroad. The need for it is great. Electricity will doubtless be the motive power used, and Boston will probably have the distinction of being the first city to operate an electric elevated railroad. The Thomson-Houston Company have been engaged for some time past in building an experimental electric locomotive for the West End Company. We believe the experiment was successful. Here's luck to President Whitney.

Last Saturday, in this city, a young Italian was killed by electricity. The young man was cleaning windows in the second story of a Broadway store. He was standing on a wet window-sill, and his hands were wet. In leaning over, he tried to steady himself by placing one foot on an iron awning frame which was attached to an iron column. With one hand he grasped an electric light wire which entered the building just above his head. A grounded circuit was formed, and the unfortunate man met death instantaneously. The wires were those of the United States Illuminating Company.

FIRE! POLICE!!

At the last meeting of the Board of Electrical Control, the usual stormy scene was enacted, with variations of a novel description. This time the dispute was of a triangular nature between the subway company and the fire and police departments. Each of these exacting bodies demanded a separate duct for their wires, but as they are both dead-heads the subway company very properly contended that they should share a duct between them, such plan being perfectly practicable.

The fire commissioner, Mr. Robbins, interposed the following profound remarks: "As the representative of the fire department, I wish to put myself on record as saying that the proposition of the subway company is impracticable. I wish to put myself on record as saying that if the police and fire departments are compelled to place their wires in the same duct, the whole city will be endangered." Mr. Robbins' sententious utterances irresistibly remind us of a famous public official of immortal memory who wished to put *himself* on record, but he, Dogberry, expressed Mr. Robbins' evident desire in fewer words and plainer language.

Does the sapient fire commissioner imagine that the police wires are as cantankerous as the members of the force, and that they are going to maul and maltreat the inoffensive fire wires in the ducts and manholes? Do not the high tension alternating lion and the low pressure continuous lamb lie down together, and does either suffer? If induction troubles the telephone circuits, let the departments provide themselves with metallic circuit cables of approved type.

The Mayor, of course, sides with the captious official wiseacres, but as his Honor's knowledge of technical matters is even inferior to theirs, that is not to be wondered at. The subway company, however, finally carried their point and the important question which had occupied the valuable time of the meeting, viz., as to how many wires can be placed in a three-inch pipe, was referred to the engineer and expert of the board for report.

UNDERWRITERS' ELOQUENCE.

At the annual meeting of the National Board of Underwriters, held recently in this city, the various methods of heating and lighting were discussed in connection with fire risks, and electric lighting came in for a large share of attention. The speaker of the occasion rose to the level of his subject, and a bit above it, as the following excerpt from his very brilliant speech will show:

"The great problem before us to-day, however, is the management of the various systems of electric lighting, so as to insure safety from fire. When such lights were first introduced, underwriters congratulated themselves that at last the long sought means of illumination without danger had been found.

"It did not take many months, however, to discover that the electric light was not the harmless thing we had imagined, but that it was a most prolific source of danger, and its introduction has cost the insurance companies more than any method of lighting heretofore in use.

"It has come to stay, and some time it will probably be as safe as any light in use, but our knowledge of its properties and of its management must be vastly increased before that time appears. We see the danger, but as yet are too ignorant to point out the remedy. What yesterday seemed a safe method of installation, to-day proves dangerous, and what we regard as safe to-day is likely to develop danger to-morrow."

It is with the last paragraph of these remarkable utterances that we wish to take issue. Putting aside the part which reads like a paraphrase of that very tiresome and hackneyed reference to electricity as "being in its infancy," but nevertheless "the coming power," to say that "we see the danger, but as yet are too ignorant to point out the remedy," and that "what yesterday seemed a safe method of installation, to-day proves dangerous, and what we regard as safe to-day is likely to develop danger to-morrow," is to utter so much vapid, meaningless, fatuous nonsense. The real source of all the danger, and the origin of all the trouble, is the noble army of cheap contractors engaged in doing work all over the country, which they have neither the means nor the knowledge to carry out efficiently. The Cheap-Jack contractor who underbids his more conscientious business rival, and obtains patronage from the many who can see no deeper into an installation than the figures in the bid, is the deadliest enemy that the electric light ever had or ever can have in this or any other country. The electric light, properly installed, is the safest illuminant that has yet been devised, but cheap work in wiring a building, involving bad insulation and slack construction throughout, will convert it into an insidious danger.

Electric lighting companies and underwriters should combine to stamp out the cheap contractor; it will be a difficult job, as he has got a firm footing and is increasing and multiplying daily; but the interests of a great industry, which he is doing his best to discredit, demand his extermination.

Adolph Eccard, the mechanician of the Signal Office, at Washington, died on the 16th inst. He was the inventor of the Eccard telephone which served as the basis of one of the infringing companies until the latter was enjoined by the Bell Telephone Company.

Nantucket, Mass., that quaint little island in the sea, has petitioned for an electric railway. A few years ago, when a narrow gauge railroad was built on the circumference of the island, the natives were more than astonished. Some of them had never ridden on a railway. What will they say when a car propelled by electricity dawns upon their view? It is probable that some old tar, standing in the doorway of the "House of Lords," may ejaculate, "Thar she blows!"

The St. Louis *Post-Dispatch*, of May 6th, in speaking of the marked effect of increased street illumination on midnight offences, says: "The great reduction in the number of offences against property and order is to be attributed directly to what may be called a superabundance of light, there being no dark alleys or dimly lighted streets along which the burglar or thief can hurry and elude the vigilance of actual possible pursuers. The existing condition of affairs makes it pleasant to the law-abiding citizen, and a source of security to the householder."

CORRESPONDENCE.

Electrical Happenings in Washington, Chicago and Boston.

OUR WASHINGTON LETTER.

When the Sal-Ammoniac Item in the tariff bill was reached by the House of Representatives, a strong effort was made to put the duty down to 10 per cent., *ad valorem*, and a good deal of sentiment was wasted by certain members, who understood that this article was largely used in the manufacture of fertilizers, and that the farmers of the country were in danger of being imposed upon but after an explanation that sal-ammoniac is used almost exclusively in electrical batteries, and that the increased duty would come out of the Western Union Telegraph Company and other monopolies, the amendment passed without objection.

Of the Numerous Applications for authority to build new electric railroads in the District of Columbia, which have been made to Congress, the only one so far granted is to the Rock Creek Railway Company. The charter to this company has passed both houses. The road is to run from the north western boundary of the city, a distance of about five miles, to the neighborhood of Gardiner G. Hubbard's country residence. The charter forbids the use of any overhead wires in the city and allows their use on the greater part of the route. The president of the company is Mr. George Truesdell, whose marked success with the Thomson-Houston Eckington road will, doubtless, go a long way in deciding the plans for the construction and equipment of the new road. The present feeling in Congress in relation to the overhead railway lines is decidedly hostile to their use within the limits of Washington city, but there is no great objection to their use in the suburban districts. The question of requiring the removal of all these overhead lines at the end of three years has received a good deal of consideration, and neither side makes any special objection to such a requirement. The advocates of overhead wires believe that in less than three years their use will prove so satisfactory that nobody will want them removed, and their opponents believe that public clamor will become so great that the railroads cannot maintain them. Meantime there is a growing conviction that, for many city lines, an independent motor for each car is a necessity, and experiments with storage batteries are watched with great interest.

During the Discussion in the United States Senate on the Rock Creek Railway bill, the following letter was read at the request of Senator Vest, who expressed his belief that Mr. Westinghouse is one of the foremost authorities upon the question of electricity in the world:

MARCH 29, 1890.

MY DEAR SIR: Your favor of March 21 has remained unanswered owing to my absence from Pittsburgh.

A great deal has been said by interested parties with reference to the safety of a 500-volt current, that current being used generally for the operation of railways by means of overhead electric conductors. This system usually involves the use of a bare wire running above the track forming one part of the circuit, and the rails or the ground forming the return circuit; so that whenever a wire crosses one of these bare wires and touches a horse, the horse having iron shoes, an unusually good path is formed for the passage of the electricity.

Everything depends, of course, upon the quantity of electricity. Professor Morten having recently stated in public that he had had as high as 1,000,000 volts without injury, but, of course, the quantity must have been infinitesimal.

The electric conductors used for lighting purposes are usually well insulated, and all connection with the ground is prevented, so that whenever a person touches a wire, even if he stands upon the earth, he does not necessarily receive a sufficient quantity to cause injury.

The most serious objection to the use of the overhead system for railway purposes is because a bare wire is used for one part of the circuit and the ground for the other, making the chances for fire and other accidents very great.

Hoping that the information I have given you will prove satisfactory, I am truly yours,

GEO. WESTINGHOUSE, JR.

HON. G. G. VEST,
United States Senate, Washington, D. C.

The National Pharmaceutical Society, at its session in Washington, last week, after a long and spirited debate, formally adopted the metric system of weights and measures.

Washington, D. C., May 17. G. C. M.

OUR CHICAGO LETTER.

M. M. Snipe, of Austin, Texas, was a recent visitor in the city, and while here closed a contract for the equipment of five miles of electric road in Austin. The railroad company will be known as the Austin Traverse County Rapid Transit Company.

Personal.—Wm. Brown, manager of the Hawkeye Electric Manufacturing Company, of Davenport, Iowa, visited the city this week.—Lafayette Cole, traveling salesman for Holmes, Booth & Haydens, stopped over in the city on his way East and called on his friends.—Major Evarts, traveling representative for George Cutter, has returned from an extended trip and reports business good.

Fire was Discovered by the night watchman at the Knapp Electrical Works early on Tuesday morning. An alarm was turned in, the fire department responding, soon had the flames under control, but not until the two upper stories of the building, in which the store-room and shop are located, had been pretty well burned out. Water flooded the offices and retail department, causing considerable damage. The total damage by fire and water will probably amount to $6,000, fully covered by insurance.

The Northwest Thomson-Houston Electric Company, of St. Paul, have recently closed a contract for 400 tons of steel rails for Spokane Falls, Washington.

Chicago will soon have an electric street railroad, articles of incorporation having been filed on Friday, at Springfield, Ill., with the Secretary of State, of the Calumet Electric Street Railway Company, of Chicago, Ill. The railway to be constructed from a point in Chicago to the boundary line between Illinois and Indiana. The capital stock is $50,000, and the following gentlemen the incorporators: Nathaniel R. Fairbank, Joel D. Harvey, Wm. V. Jacobs, Otto S. Gaither, Samuel E. Gross, all of Chicago.

The Chicago Edison Company have to-day closed a contract with W. P. Adams & Company, Western representatives of the McIntosh & Seymour Engine Company, of Auburn, N. Y., for two 200 horse-power high speed engines. These engines will be used to drive Edison dynamos in the Central Station on Adams street.

McIntosh and Seymour Engine Company have lately placed on the market an entirely new style of tandem double compound engine of 500 horse-power; great efficiency is claimed for this engine. Two of these engines have lately been installed at Salem, Mass., and are giving marked success.

Chicago, May 17, 1890. D. B. D.

OUR BOSTON LETTER.

The New Haven Clock Company's New England agency, heretofore located at No. 54 Summer street, this city, has been removed to an extensive establishment, No. 60 Summer street.

The Page Belting Company, of Concord, N. H., has begun the building of several large additions to its factory.

Mr. F. S. Pearson, electrician for the West End Street Railway, of this city, gave an entertaining and instructive lecture before the Parker Memorial Science Club, last Sunday evening. Subject "Electricity and Electric Cars."

New Welding Machine.—The new electric machine for welding shells, invented by Lieut. Wood, U. S. N., which has been in course of construction for some weeks past at the works of the Thomson Electric Welding Company, Lynn, Mass., is finished. Yesterday several satisfactory experiments were made with the new machine, and it has been pronounced an assured success.

Mr. M. K. Kendall, of the enterprising and well known electrical construction firm of Kendall & Slade, this city, is in Canada, selecting 500 poles to be used in constructing the electric light circuits of the Lynn Gas and Electric Company, at Swampscott, Mass.

Consolidation of Electric Light and Gas Companies.—In the Massachusetts legislature, on Wednesday, the committee on manufactures reported ought to pass, with amendments, on the bill to permit the consolidation of gas and electric light companies. One amendment is that the agreement for consolidation shall be executed by the presidents of the constituent companies only after it has been approved by a vote of two-thirds in number and interest of the stockholders of each corporation at a special meeting. Instead of "a majority of the appraisers" fixing the capital of the new corporation, the "appraisers" may do it.

The Police Commissioners of Massachusetts have investigated the Essick printing telegraph system at the offices of the New England Printing Telegraph Company, No. 113 Devonshire street, this city, and were so well pleased with the working of the system that its adoption by the police departments of the largest Massachusetts cities is simply a question of time.

The Abendroth & Root Manufacturing Company, of New York, has recently introduced in this section a new boiler which is finding great favor among the electrical people. The Thomson-Houston Company and the Belt Line Electric Railway Company, of Lynn; Armington & Sims, of Providence, and many other well-known concerns are already supplied. For this boiler it is claimed that it makes perfectly dry steam, has large boiler capacity in small space and is non-explosive.

Electric Lights at the Bijou Theatre.—Mr. Fred. Swan, electrician of the Bijou Theatre, of this city, has just installed a 500 light Thomson-Houston incandescent dynamo in that theatre, also introducing several new features in theatre lighting. The plan is much after that of the Bijou Theatre, of Philadelphia, Penn. The play house will be ventilated by a 60 inch fan, which will be run by an electric motor and exhaust about 100,000 cubic feet a minute, changing the air of the house once every four minutes. The Jarvis Engineering Company, of this city, installed and equipped the steam plant and assisted Mr. Swan in important details toward making the Bijou Theatre plant one of the neatest and most satisfactory of isolated installations in the country.

Several Other Electric Roads have been projected in New England, viz: Nantucket, Mass., to Cisshonet, Mass.; Fall River, Mass., Street Railway; Randolph, Me., Street Railway; High Street Railway, at Newburyport, Mass., and a new line to be built between Manchester, N. H., and Lake Massabesic.

Messrs. Ziegler Brothers, two young men of broad electrical knowledge and practical experience, are manufacturing and have for sale fine electrical and mechanical instruments. The Messrs. Ziegler also make special electrical work to order. Their laboratory and office is at No. 73 Federal street, this city.

The Eastern Electric Cable Company, 61 to 65 Hampshire street, this city, has just issued a neat catalogue of 16 pages, containing wire tables and price list of the Clark Wire and Cables. The Clark Wire has been before the public and in use for over nine years, and has given thorough satisfaction wherever used.

Thomson Scientific Club.—At the first annual banquet of the above named organization, at Exchange Hall, Lynn, Mass., evening of May 13, the principal speaker was Prof. Elihu Thomson, his subject being "The Electrical Engineering Problem of the Future." He made some startling predictions, among them, that sooner or later the problem of getting electrical power direct from fuel without the intervention of steam would be solved, but we might have to pass through the dynamo era first. Another prediction that some time electrical railroading would be so perfected that a speed of 100 or 150 miles an hour would be secured with safety. He thought the application of electricity to chemical work would ultimately result in the ability to manufacture food products from raw materials, and thus one of the great problems, that of food supply, be solved. Other speakers were, Rev. Dr. Hazlewood, J. F. Meech, A. L. Rohrer and J. F. Randall.

The Electrical Safety Company has sold the rights under its patents for the New England States to the New England Electrical Safety Company—treasurer and secretary, C. F. Atherton, late of the Thomson-Houston Company. Negotiations are pending for New York and New Jersey, Pennsylvania, Maryland, District of Columbia, the two Virginias, also for Michigan, Wisconsin and Illinois. The present company possesses the right of manufacture.

The Providence Telephone Company held its annual meeting, on Wednesday, to elect its officers and board of directors for the ensuing year. The following directors were chosen: Henry Howard, Henry G. Russell, Henry C. Cranston, R. G. Hazard, R. M. Larned, J. E. Hudson, James H. Chase, H. F. Barrows, F. H. Peckham, Jr., J. W. Starkweather, Albert O. Morgan and Dexter B. Potter. A resolution was passed authorizing the board of directors to increase the capital stock of the company by the issue, at their discretion, of the whole or any part of the additional $100,000 allowed by the charter. The following officers were elected: Henry Howard, president; Henry C. Cranston, vice-president; Chas. H. Howard, secretary and treasurer: Henry W. Harris; assistant secretary and treasurer; A. C. White, superintendent; O. C. Goodwin, auditor.

Prof. Elihu Thomson, of the Thomson-Houston Electric Works, has recently patented an invention which applies the principles of electric welding to soldering and cementing. By it, after the parts are put together and properly shielded, the electric cement is applied, and under pressure the parts are fused together, the heat being applied just where it is wanted.

A Good Deal of Time is being put into the work of perfecting overhead details of electric cars at the Thomson-Houston electric factories. Professor Thomson has patented a copper trolley guard, so arranged that when the trolley is thrown off by a frog, the guard will run along the trolley wire conveying the current to the incandescents in the car until it is replaced. Lieutenant Cahoon, superintendent of the expert department, has designed a detachment trolley, which, when it strikes a frog, will drop off, and is attached to a chain, and can be immediately replaced. It has been successfully tried on the West End road, and 12 more will be immediately put on.

The New Electric Radial Car.—The West End Railway Company, of this city, has at its shops and all but ready to put into service, a new motor car equipped with the Robinson truck, illustrated and described recently in these columns. Except in size this car differs from the old box cars only in the number and character of the trucks. There are three trucks, each having one pair of wheels. The two end trucks swing on pivots, as does the forward truck on a locomotive. The center truck is held in place by connecting rods, but is not fastened to the car above. The body of the car rests upon roller bearings in the truck. The purpose of this new truck equipment is to facilitate the rounding of curves. A car of this same general description is now in service on the Allston division and is rendering satisfactory service. This new car will seat from 40 to 45 persons, where the ordinary box car will seat 22. It is more roomy for standing as well. And herein lies the value of this car: It requires one driver and one conductor to run an ordinary box car, the relative earning capacity of which may be indicated by its seating capacity, 22, and it will require but one driver and one conductor to run the new car, the relative earning capacity of which may be indicated by its seating capacity, 45. Hitherto two men have been required to every 22 passengers, because the limit of motive power was reached; hereafter two men will be required to every 40 passengers because the motive power already supplied is ample to move the larger car.

Electric Stocks.—Boston quotations at closing hour of the Exchange, Saturday, May 17, were as follows:

Thomson-Houston Electric Company	55¾
" " " " Preferred	25¾
" " " " Series C	17
" " " " Series D	7¾
Thomson Electric Welding Co	225.
" European Welding Co	120.
Westinghouse Electric Co	39.
Fort Wayne Electric Co	13.
Lynn Gas and Electric Co	150.
Edison Phonograph Doll Co	4.
TELEPHONE:	
American Bell	233.
Erie	41.
New England	50¾.
Mexican	1.15
Tropical American	1.25
National Tel. Mfg. Co. (acoustic)	.65

Boston, May 17, 1890. W. I. B.

PERSONAL.

Last week, Lieut. Cahoon lectured before the Engineers' Club, of Lynn, Mass., on "Hysteresis."

Mr. H. J. Conant, of the Evans Friction Cone Company, Boston, was a New York visitor last week.

Mr. J. Swinburne, one of the editors of our esteemed London contemporary, *Industries*, arrived in New York this week, and will spend a couple of weeks in the United States.

Mr. Thos. F. Clohesey, electrical engineer, of Kansas City, Mo., is remembering his friends with a very attractive little hanger, on which appears his card, and also the features of a dark-haired houri, whose beauty reflects Mr. Clohesey's fine taste and judgment.

George G. Blakeslee, late foreman of the electric wire department of Benedict & Burnham, Waterbury, Conn., was presented by his fellow employés with a gold headed cane and a pair of gold rimmed spectacles, on his departure to assume the management of the Matthews & Willard Manufacturing Company's works.

Mr. J. Frank Morrison, for years an active worker in the central station branch of electric lighting, has joined the staff of one of the leading manufacturing companies, and will hereafter represent the Fort Wayne Electric Company, with headquarters in Baltimore. The Fort Wayne Company is building up an extensive business in that city, which will be rapidly extended under Mr. Morrison's aggressive and energetic management.

Lieutenant Ambrose B. Wyckoff, assistant to the chief of the Bureau of Yards and Docks, who has had much experience in electrical affairs, has been making a tour of inspection to Boston, New York, Philadelphia and other places, to gain information needed in preparing plans for the proposed electrical plant for the New York Navy Yard. This plan contemplates the use of arc and incandescent lights for the usual illuminating purposes, and for special uses in connection with certain work to be done in the yard; various applications of electric motors, electric welding and some other arrangements.

Flash Light Signaling.

The greatest achievement yet made in heliographing was accomplished during practice in the Department of Arizona, last week, by Lieut. Wittenmeyer, who succeeded in sending a message by a single flash 125 miles, from Mount Reno, near Fort McDowell, to Mount Graham, near Fort Grant, where it was received by Capt. Murray. The latter, by turning his instrument, flashed the message to Fort Huachuaca, a distance of 90 miles, making a distance of 215 miles with a single intervening station. The longest distance heretofore made with a signal flash is said to be about 70 miles.

Telephonic News.

⁂ There are now 437 telephones in use in Seattle, Wash., and the number is constantly growing.

⁂ General Superintendent D. I. Carson, of the Southern Bell Telegraph and Telephone Company, was in Atlanta, Ga., on May 10.

⁂ The Bell Telephone Company will begin at once the construction of telephone lines between Quebec, Ottawa, Montreal and Sherbrooke. The lines are expected to be ready for service in September.

⁂ The underground conduits and cables of the Milwaukee Telephone Company have been completed, and the clearing of the streets of the poles will begin very shortly. The work has entailed an expense of $135,000.

⁂ The Southern Bell Telegraph and Telephone Company commenced building a copper metallic circuit 40 miles long, on May 12, at Atlanta, connecting with Newnan; on which they will use long distance instruments.

⁂ The Southern Bell Telegraph and Telephone Company are building a new exchange at Fort Payne, Ala. They are to use the magneto system Western Electric standard switchboard, connected with 50 subscribers.

⁂ At the annual meeting of the Providence, R.I., Telephone Company, last week, the election of directors for the ensuing year resulted in the choice of Henry Howard, Henry G. Russell, Henry C. Cranston, R. G. Hazard, second, R. M. Larned, J. E. Hudson, James H. Chase, H. F. Barrows, F. H. Peckham, Jr., J. U. Starkweather, Albert O. Morgan and Dexter B. Potter. A resolution was passed authorizing the board of directors to increase the capital stock of the company by the issue, at their discretion, of the whole or any part of the additional $100,000 allowed by the charter. At the directors' meeting Henry Howard was elected president; Henry C. Cranston, vice-president; Charles T. Howard, secretary and treasurer; Henry W. Harris, assistant secretary and treasurer; A. C. White, superintendent, and O. C. Goodwin, auditor.

⁂ The following conversation occurred over the telephone wire, between the house of Senator Stanford and the office of the Washington *Post*, on the evening the Senator returned from California:

The *Post*—"Is that Senator Stanford?"

Mr. Stanford's private secretary (with a mental reservation)—"Yes."

"Can I send a reporter up to interview you on the silver question, Senator?"

"I don't know."

"I say can I send a reporter to interview you on the silver question?"

"You'll have to ask your editor."

"You don't understand me. I said, Can I send a man to interview you?"

"I don't know what you can do. Ask your editor."

"But I represent the editor. I am the editor. Can you tell me whether I can send a man up to your house?"

"You'd better ask your publisher, if you don't know?"

"What?"

"I say, if your editor doesn't know what you can do, perhaps your publisher does."

"But you don't understand. I want to know if I can send a man to your house?"

"Perhaps you want to know if you may send a man to the house. Yes, I suppose you may."

"Will you see him?"

"That's an entirely different matter. He can learn that by coming up."

After a little more sparring, the *Post* sent a man to the Senator's house and got the interview; but the telephone editor has come to the conclusion that even a Senator can be too exact in the choice of language.

"Telephone Engineering."

A PAPER READ BEFORE THE NEW YORK ELECTRICAL SOCIETY, MAY 15, 1890, BY JOHN J. CARTY, ELECTRICIAN OF THE METROPOLITAN TELEPHONE AND TELEGRAPH COMPANY, NEW YORK.

Electrical engineering is a young man's science. When Dr. Harvey announced his discovery of the circulation of the blood, there was not a physician over 40 who believed in the truth of his doctrine. The older men of the present day do not altogether reject electrical innovations, and are in some cases even too credulous, yet the discoveries in science crowd upon each other so rapidly that only the minds of the younger men are sufficiently plastic to accept the changes which are constantly being made. While there is no science which stands in greater need of the calm and deliberate judgment which comes only with mature years, the extreme newness of electrical engineering places the young man and the old upon the same basis as regards experience, yet gives the former a tremendous advantage on account of the energy and enthusiasm of youth.

No disgruntled old fogy can tell us how he used to build telephone exchanges before we were born, nor that he operated a double trolley road in the "wet Fall of '38." On the other hand, we cannot have the advice or experience of our elders in the technical troubles which daily beset us. A stranger going into the office of an electrical engineer with whom he is not personally acquainted, is almost sure to make a mistake and select one of the clerks as the engineer.

Electrical engineering, although so new, has already divided itself into specialties and sub-specialties. None of its various branches offers a broader field or a more fascinating future than telephony. There has been a disposition to reserve the term "engineering" for the so-called heavy branches. There is nothing to support such a position, as although the telephonist is not called upon to deal with such works as the Brooklyn Bridge, or the St. Gothard Tunnel, yet telephony is not so favored by gravity that its follower is not obliged to engage in some works which are heavy, and which require a high grade of mechanical skill.

A telephone office with 6,000 subscribers requires at least 20,000 wires; the 200 cables required to extend them from the switchboard to the basement of the building weigh 250 tons, and the task of so arranging them that any cable may be drawn out at will and be replaced by a new one, is by no means simple; and where space is of such value as it is in this city, the question is further complicated by economical considerations affecting the room at our disposal.

The difficulties of underground construction can only be appreciated by actual contact with the subject; not only must the subways be kept ventilated and cool, as heat is an enemy of all insulation, but grave chemical and mechanical questions are encountered at every turn. The question of telephone cables alone is worthy of a life study by the most ambitious student.

A large switchboard, such as exists at Cortlandt street, N. Y., weighs 55 tons, and contains 19,080 miles of wire, all of which is laid out according to an elaborate and intricate system not equaled outside of the human body.

The analogy between the nervous system and the modern telephone exchange is striking and instructive, alike to physiologists and electricians. The general similarity between the telegraph cable and a bundle of nerves is well known, and described in all works on anatomy. But there are certain special likenesses of structure which suggests similarity of action, and which have never received the attention of physiologists on account of their not being familiar with telephony. For instance, in some of the highly specialized telephone systems there are two wires extending to each subscriber; one by which messages are sent from the subscriber to the central, and the other over which the central office sends communication to the subscriber. In the nervous system there is a perfect counterpart to this in the sensory and motor nerves. In case the finger is touched to a red-hot iron, a message of pain is sent over the sensory nerve to the brain, which may be considered the central office of the body. Upon the receipt of this impulse at the brain, a signal is transmitted along the motor nerve to the finger, which is immediately withdrawn from the iron by the proper muscle. In the case of a learner at the piano, the movements of the fingers must be directed in detail from the brain, but after much practice this work is performed automatically by a ganglion, or knot of nerves, which may be considered as a branch office of the brain.

A parallel to this is found in a telephone system when one set of subscribers at a distance from the exchange require constant communication with each other. The business is at first handled in the main office, but after its nature is discovered a separate small office is established near the subscriber, and the main office is relieved of this work.

If the line leading to a subscriber's station is cut off at a half way point, and a signal is sent to the central office, the operator there will naturally suppose that the call comes from the subscriber's station, although connection therewith has been entirely severed. Something like this happens when a man's arm has been cut off, and the surgeon makes a bad job of it. The irritation of the ends of the nerves at the stump which formerly led to the fingers is supposed by the central office at the brain to come from the fingers, and a sensation of pain at the fingers is produced, which is just as real as though they were attached to the body instead of being buried in the family lot.

A section of one of the conductors sometimes used in the switchboard presents a remarkable resemblance to a section of a human nerve when viewed under the microscope, and the appliances used in telephone wires to prevent induction present an appearance strongly suggesting certain incisions and indentations in the envelopes of the nerves, the use of which has never been quite clear.

There is no doubt that impulses are transmitted along the nerves, and it is no more than reasonable to suppose that, as in the case of telephone conductors, there should be devices employed to prevent lateral action between the nerves, both by conduction and induction. If such appliances do exist, it would be of the greatest interest to the telephonist and to the physician to establish the fact, and from some investigations which I have seen conducted, I think it may some time be done. I do not mean to imply that there is any identity between electricity and nervous force, or to give any aid or comfort to those charlatans who say that "electricity is life," or to the crank who talks of animal magnetism and has a headache unless he sleeps with his head to the north. I simply point out an analogy which may be helpful.

The electric light engineer can get along with simply the most superficial knowledge of the telephone, but the telephone engineer is obliged to follow closely the work of his colleague, the so-called "heavy engineer." The interferences produced in the telephone by railway and electric light circuit, due to contact and proximity, are of such a serious nature, that in self-defence, if for no other reason, the telephone man is forced into the subject. The question of regulating electric light wires, so as not to interfere with telephone lines, requires a joint knowledge of both sides of the subject, and in endeavoring to protect his telephone line from contact with naked trolley wires, the telephone engineer is led quite as deeply into the question of fuses and other protecting devices as a man can well go. Aside from this, in many respects, telephone practice is an exact counterpart of modern alternating current electric lighting, for in each transmitter is a converter presenting problems of design not inferior to those met with in electric light converters. Telephone repeating coils are simply converters which are expected to work at a high efficiency under variations of load—sometimes amounting to 1,000 per cent.; that is, they must be so constructed as to be operated by the most delicate voice currents, and also respond to the comparatively heavy signaling currents from the alternate current generators which are employed. A modern telephone line, containing 20 stations, operated in multiple arc, affords as beautiful an example of the utilization of counter E. M. F. as can be found.

The telephone itself is an alternating current generator, whose output is so small that there are elements in line construction to insure successful working, which have to be considered by the telephone engineer, although they are ignored, and in many cases almost forgotten, by his electric lighting confrere.

Electro static capacity is one of the most serious elements to be contended with in telephone construction. Were it not for this factor, telephoning around the world could be accomplished with ease. The exact nature of this action in its bearing on telephony is not generally understood. The near proximity of telephone conductors brings out this effect very strongly, and although it can be somewhat reduced by a judicious selection of the dielectric or medium separating the conductors, yet with our present knowledge there is no hope of getting a medium which shall permit less induction to take place through it, than air.

The problem then becomes a mechanical one and simply consists in keeping the conductors as far apart as possible. Of course, in underground cables this cannot be carried out to any extent, owing to the limited space at our command; but with aerial lines the case is different, and were it not for the limitations upon overhead construction imposed by the various municipal authorities, a long distance telephone system between the most distant cities of the United States could soon be an accomplished fact. With overhead lines the question of space is not the only important one, but a high grade of mechanical and electrical engineering is required to construct a pole line. In a modern long distance line the poles are set at exact distances apart and the tops kept as near the level as possible, and all strains are carefully distributed. It is due to these methods that during the great blizzard the long distance wires furnished the only means of communication with the outside world, although one message was sent from this city to Boston *via* London, by Atlantic cable. After the pole line is erected the task of so arranging the wires that they shall not affect each other or be interfered with by any extraneous circuits is one for which we cannot turn to the text books for aid. The true theory of transpositions has never been published, and I do not know half a dozen men who could design a transposition system for a 20 wire line from New York to Buffalo. The researches of Hertz, Lodge and others have an important bearing on the inductive action between telephone conductors, and, as I have previously pointed out, they suggest a possible way out of the difficulties by some arrangement of dielectrics to control this action. The work of these experimenters should be closely followed by telephonists throughout the world.

Telephony is not wholly confined to the study of electricity. A broad and comprehensive knowledge of the subject requires also some familiarity with the physiology of the human voice and ear, and an intimate acquaintance with the science of acoustics. A telephonist should be a good deal of a physicist.

The phonograph is destined to form an important part of the telephone system of the future. At some time, no doubt, a phonograph may be inserted in a telephone line to act as a sort of "talk meter," recording all conversation which goes over it. I once thought of a curious use to which the phonograph might be put; that is, in transmitting speech through one of the existing ocean cables. I have no doubt that a cable could be designed which would enable us to talk direct to Europe. In such a cable the idea would be to have the capacity and resistance as low as possible. Perhaps if there were a cable ten feet thick we might talk through it. With the present cables, signals are transmitted so slowly that before one telephone vibration reaches its destination another is piled in on top of it, and confusion is the result. Now, my idea was to first speak into a phonograph and then turn the cylinder at a speed no faster than the cable can take care of the impulses, and to have at the other end a phonograph, also revolving slowly (but not necessarily synchronously), upon which a record would be made. This second cylinder could then be revolved at the proper speed, and if all went well the transmission of speech through an existing ocean cable would have been accomplished. It has been estimated from a microscopic examination of the word "Hello" on a phonograph cylinder, that it contains 16,000 indentations. If this is true, it would be quicker to send the phonograph cylinder by mail than to rely upon the cable.

The radiophone of Prof. Bell involves the most delicate and complicated theories of interaction within human knowledge. By means of this wonderful instrument, as you all know, it is possible to telephone between distant points without the aid of a wire. The ether is used to convey the impulses. This instrument has not yet found its way into practical use, but must some day form an important part in telephone systems.

Telephone engineering is a science of the future. It is interesting on account of its possibilities rather than because of what has been accomplished. At the same time, the work which is daily being carried on by the system of the long distance company, shows that the plant of that company is unique among the engineering feats of the world.

Before the introduction of the telegraphs and railroads into this country, it was doubtful if our Union of States could be rendered sufficiently homogeneous to hold together, but steam and the telegraph have, up to the present time, enabled us to expand far beyond the conception of our forefathers and still remain the prosperous and united country that formed their ideal. Still, as our civilization becomes more complex, there is a demand for a more complete intimacy between the various portions of our body politic, and the long distance telephone comes in to meet this want and supplement the railroad, telegraph and mail.

There is a possibility in connection with long distance telephone service which has never before been pointed out, and that is its effect upon the language of our nation. As is well known, where people in different sections of a country rarely come in speaking contact with each other, there is a gradual change in the language, which ultimately results in the formation of a dialect, and, while the telephone can never compensate for those differences in speech which are due to climatic influences, it will be an important factor in preserving the uniformity of our language.

The telephone has never been used in a great war, but it is capable of martial application, perhaps not as important, but not less unique than characterizes its use in time of peace. A short time ago, General Manager Hall, of the Buffalo Telephone Company, assembled in less than half an hour the entire Board of Trade of that city to attend a meeting on an important subject connected with their commercial interests, and which meeting could only have been called by the aid of the telephone. This should suggest to our military authorities its utility in the mobilization of the various State militia organizations. With a telephone in every block in every city in the land, it would be possible to assemble all of the State militia in this country in a few hours. In Germany, the telephone, like the telegraph and railroad, is controlled by the government, and telephone officials are assigned to a regular place in the field, to be taken on the commencement of hostilities.

Some time ago, Mr. Preece made some experiments to determine the effect of the great Deptford 10,000 volt alternating current dynamo upon neighboring telephones, and he came to the conclusion that when this dynamo was working, all of the telephones in London would be interfered with, owing to their connection with the earth. At that time I pointed out that by means of a dynamo properly connected with the earth and a set of telephones, a besieged garrison might communicate with a relief party by signaling through the earth itself. Similar signals might be sent with the aid of a telephone from a ship to the shore, or from one ship to another. In this connection a remarkable statement has recently been attributed to Mr. Preece, to the effect that the operation of the Deptford dynamo created disturbances in the telephones of Paris.

It has not been my purpose in this paper to foster any antagonism between the different schools of electrical engineers, but rather to counteract a growing tendency on the part of young men in choosing a profession, to consider the telephone question as solved, and not presenting a field in which their energies and abilities could find proper scope.

The Southern Bell Telegraph and Telephone Company have recently purchased property in Atlanta, on corner of Forsyth and Poplar streets, and intend erecting a large building in which will be located their central office with new and improved apparatus, which will completely fill all they want in their fast increasing business in this section.

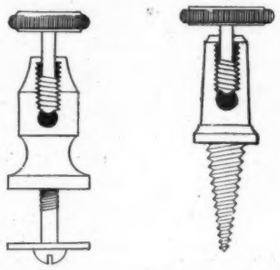
The English syndicate have authorized the Intercontinental Telephone Company to draw for the purchase money, and these funds will be disbursed to the Tropical American Telephone Company and the other shareholders. The Tropical American Telephone Company has closed a contract with the Governor-General of Cuba for 100 sets of instruments and a large lot of supplies, the Cuban government having taken over the telephone business formerly operated by the Compania Electrica de Cuba. An order for 500 complete sets has also been received from Rio de Janeiro. This export business thus far in 1890 is more than double that of any previous year.

The police patrol telephone system in Washington has become an indispensable adjunct to the police service and is being gradually extended to cover the entire city. The Georgetown precinct is to be equipped with the necessary wires and apparatus shortly, and bids for the work have been received by the commissioners from the Gamewell Fire Alarm Telegraph Company and from the Municipal Signal Company, of Boston. The latter proposes to furnish its police alarm and inter-communicating system, such as is in use in Boston, Providence and other places, for $3,600. This includes 14 stations, with all accessories complete. The Gamewell Company submits two bids for the same number of stations at $3,150 and $3,750, for apparatus of somewhat different descriptions. Overhead wires are to be used. This is owing to the continued poverty of the government which, while arbitrarily compelling all private persons and corporations to put their wires underground, cannot afford to do its own work in the same manner. The chief of police is considering the subject of long distance telephony and is anxious to avail himself of the great advantages which this service would bring to his department. Its utility is obvious.

The Delany Security Binding Post.

An invention which will go far towards curing the ills which binding posts are heir to, is illustrated by the accompanying cuts. Mr. P. B. Delany is the inventor. Any one who has had anything to do with binding posts does not need to be told of the Herrmannesque way in which the screws are sure to disappear.

The screw of the new binding post cannot come out. It backs out just far enough to clear the hole, but no further. The thread of the screw is on a shoulder larger than the stem, and as the neck of the cup is turned over tight up to the stem the screw part cannot pass. The operation is plain and perfect. The binding posts are made in all sizes and shapes. They look just like the ordinary binding posts. It will be strange indeed if they do not supplant the ordinary binding posts altogether, not only for telegraph and telephone instruments and switches, but for all kinds of electrical machinery, including dynamos and electric motors. One great advantage of the new post is that when wiring has to be done in dark and difficult places it can be known with certainty that the wire hole is clear when the screw is withdrawn to the limit.



DELANY'S SAFETY BINDING POST.

The E. S. Greeley & Company have the exclusive right of manufacture and sale and will supply all dealers.

American Institute of Electrical Engineers.

The Institute held its annual meeting and election of officers on Tuesday evening, May 20th, at eight o'clock, in the house of the American Society of Civil Engineers, 127 East Twenty-third street. A general meeting was held the next day at the Massachusetts Institute of Technology, Boston. Members left New York for Boston on the midnight train after the Tuesday evening meeting.

The general meeting for the reading and discussion of professional papers was held at the New building, corner Boylston and and Clarendon streets, Boston. The morning session on Wednesday was called to order at 10 o'clock. Proceedings were opened with an address of welcome by Gen. Francis A. Walker, Ph. D., LL.D., president of the Massachusetts Institute of Technology. After a response, the following papers were read: "Electric Lighting in the Tropics," by Wilfrid H. Fleming, of New York city. "Magnetic Data of the Sprague Street Car Motor," by H. F. Parshall, of New York city. "Note on a New Photometer," by Dr. Edward L. Nichols, of Ithaca, N. Y. "The Limitations of Steam and Electric Transportation," by Oscar T. Crosby, of New York city. At 1 P.M. a recess of one and a half hours was taken.

At the afternoon session, the reading of papers was continued, as follows:

"The Industrial Utilization of the Counter Electro-motive Force of Self Induction," by Thomas D. Lockwood, of Boston. "A Study of Arc Light Carbons," by Louis B. Marks, of Cornell University. "The Practical Aspects of Alternating Current Theory," by Dr. Michael I. Pupin, of New York. "Automatic Electric Welding Machines," (with experimental demonstrations), by Hermann Lemp, Jr., of Lynn, Mass.

.... Western Union test offices receipts for the first week in May, 1890, were $248,750, an increase of $19,150.

The New Postal Bill.

The modified and completed postal telegraph bill which Mr. D. H. Bates has been at work on for the postmaster-general for some time past, has been finished and presented to the House Committee on Post Offices. It carries out the general idea of Mr. Wanamaker in providing for a compromise telegraphic service under a partnership arrangement between the government and private corporations. The new bill authorizes the making of 10-year contracts with one or more telegraph companies, now in existence or hereafter incorporated. The postmaster-general is to invite proposals by public advertisement, and is left to his own judgment in deciding which proposals to accept. The companies will be required to connect one-half of the contemplated telegraph stations within two years from the approval of the act, one-half the remainder within the next year, and the rest in one year more. The contracting companies are prohibited from engaging in the sale of any press reports, election reports, market quotations or general news, and from owning any stock in any company doing such business. The schedule of rates is based on messages of 20 words or less, counting address and signature, and is as follows:

Between stations within any one State or territory, and between such stations, not in the same State or territory, and less than 300 miles distant from each other, 15 cents.

Between stations not less than 300 miles apart and not in the same State, east of and including the States of Winconsin, Illinois, Kentucky, Tennessee and Mississipi, 25 cents.

Between stations not less than 300 miles apart and not in the same State or territory, west of and including the States of Minnesota, Iowa, Missouri, Arkansas and Louisiana, 25 cents.

Between stations in the following named States, and not less than 300 miles apart, and not in the same State, viz., Alabama, Arkansas, Illinois, Indiana, Iowa, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Tennessee and Wisconsin, 25 cents.

Between all other stations not provided for above, 50 cents. The charges for all words in excess of the first 20 words shall be at the rate of one cent per word.

It is expected that Dr. Green, the president of the Western Union Company, will have a final hearing before the committee this week.

Elevated Railroad for Boston.

The legislative street railway committee reported in the Senate last week in favor of granting the petition of the West End Street Railway Company for a charter to build an elevated railroad in Boston. All other petitioners are given leave to withdraw. This, however, is not adverse to the Meigs Company, as its bill, which was reported several days ago and is now on the table of the House, really covers all that company desires. Senator Goodwin and Representatives Howland, Varnum and Cate, dissent from the report. The bill will be specially assigned in the Senate for some day next week.

Electric Welding.

Sir Frederick Bramwell's Paper on "Electric Welding," at the Institution of Civil Engineers, recently, occasioned a remarkable degree of interest amongst the members, numbers of whom could not find room in the theatre. A formidable array of electric welding appliances gave promise of some large scale experiments; but the most unique feature of the evening was the hammering of a 1¼in. iron bar on an anvil by two smiths. What would Telford, Brunel and Stephenson, have thought of an anvil ringing and sparks flying from the actual welding of a large iron bar behind the president's chair?—*London Electrician.*

.... The Postal Telegraph Cable Company has filed in the office of the Secretary of State, at Albany, a certificate of increase of capital stock from $5,000,000 to $10,000,000, for which privilege it paid into the State Treasury a tax of $6,250.

TELEGRAPHIC

.... The Postal Telegraph Company is building into Denver, Colo.

.... The Western Union Telegraph Company have just completed three new circuits for Atlanta, connecting with New York, Washington and Jacksonville, Fla., direct.

.... A mortgage for $1,500,000 has been recorded in the County Clerk's office, in Newark, N. J., made by the New York and New Jersey Telephone Company to the Atlantic Trust Company.

.... The annual meeting of the Electric Train Signal Company was held at Portland, Me., last week, and the old board of directors were re-elected. Gen. B. F. Peach, Jr., of Boston, was re-elected president; W. C. Johnson, Jr., of Boston, treasurer and general manager; Charles E. Todd, of Boston, secretary, and C. A. True, of Portland, clerk.

.... Washington private advices recently said that the committee on post offices had decided to give Postmaster-General Wanamaker one more chance to present his postal telegraph scheme, and would invite Dr. Green, of the Western Union, to meet the committee. It is asserted, however, that there is no possibility of the approval of the Postmaster-General's plan by the committee or by Congress. There will be no legislation at this session.

.... Lyman Dwight, of the Great Northwestern Telegraph, Winnipeg, and Frank Lones, of the Western Union, are in Victoria, B. C., sounding the public pulse regarding the construction of an extra line into Victoria. The scheme is from the Western Union to build a line from Seattle to Blaine, on the boundary. The Great Northwestern will take it up there and carry it to Westminster and Vancouver, whence a cable will be laid to Nanaimo and a wire strung from there to Victoria. It is likely that a line will be built from Victoria to Port Angeles.

A Lost Opportunity.

Six men of us had come out of the mines in Montana to take a train for the East, but the train we intended to take met with an accident and was several hours late. The station was a small one, the weather very bad, and after a while one of the party went to the agent, who was also the telegraph operator, and asked how long before we might expect the train.

"Dunno," was the brief reply.

"You don't! Well, then, find out!" exclaimed the other.

"When I do I'll let you know."

"Oh, you will, eh? Now, then, you ask Roseburg if the train has left there yet."

"I'll be —— if I do!"

One man out with his gun and was going to shoot, but two or three of us drew him away and talked to him, and finally cooled him off. The most solid argument we advanced was that if he killed the operator we could get no news of the train, and would be even worse off than we were. This argument was what decided him, and five hours later the train came along and we got aboard. We were all seated together and had got a fair start when some one observed:

"That operator had a narrow escape."

"Yes, I meant to shoot him," replied the man who had pulled his gun, "but these gentlemen argued that in case I did we could not hear from the train at all."

"Thunder!" gasped a third. "Why, I'm an old operator myself, and had you shot him I was all ready to locate that train in five minutes."

"Then, may I be teetotally kicked to death by jackass rabbits!" groaned the would-be slayer, and he leaned back and nursed his disappointment, and would not speak to any of us for the next three hours. —*New York Sun.*

* * The Birmingham, Ala., Electric Railway Company will issue $2,500,000 of bonds to equip its system.

* * The first electric cars in Germany are to be introduced in Halle, to be operated by the American overhead wire system.

* * The new electric street railway in Butte, Montana, is planning to add 1,000 horse-power over what will be necessary to run their cars, for the purpose of supplying power for the city.

* * The growing popularity of electric street railways is illustrated in the case of St. Louis. Seven companies, with lines extending 92 miles, are at work equipping their roads with the overhead electric system.

* * Ground has been broken for the Union Street Electric Railway, which is to be six miles long, having terminals, respectively, at Sawyer's Mills, in Dover, and Salmon Falls, in the town of Great Falls, N. H.

* * The New Haven Electric Company has purchased the E. S. Kimberly property on Grand avenue, New Haven, Conn., and it is said that the company intend to remove there its electric light and power equipment from its present station.

* * Salt Lake City, Utah, has granted franchises to two new street railway companies. By the end of this summer, these, with the old companies, will have 65 miles of electric street railway in operation. The new council is running the city on a more liberal plan.

* * The public hearing given the New Bedford, Mass., Union Railway Company, proved to be a lively one, and the railway people are jubilant over the prospect of being granted the right to erect poles and string wires for the trolley system of electric locomotion, which they now consider almost certain.

* * The capital stock of the Missouri Railway Company, of Jefferson City, Mo., has been increased from $900,000 to $2,400,000. Of this increase, $500,000 will be used to take up bonds, $250,000 for electric plant and the balance will be put in the treasury to be used for other improvements of the property.

* * The Essex Electric Company hopes to break ground for its new line from Peabody to Salem, on Monday or Tuesday of next week. It is now understood that the proposed syndicate deal for the possession of the existing lines of street railway in and out of Salem, will undoubtedly be consummated within the next ten days.

* * The Thomson-Houston Electric Company, whose business is so closely identified with Lynn, Mass., on the occasion of the February fire, corresponded with a number of firms in various parts of the country, suggesting that, as they received direct benefit from the industries of the burned city, they might like to contribute to its necessities. The responses were generous, both in number and amount, and the sum thus received, $3,375.80, has now been turned over to the relief fund.

* * Articles of association have been prepared and the necessary subscriptions secured for a new street railroad corporation, to be known as the Newton, Mass., Central Street Railway Company. The capital stock is $30,000, and it is expected that the overhead system of electric propulsion will be used, as many of the principal subscribers to stock are also interested in the Newton Street Railroad, now constructing a line between Newton and Waltham. The location to be asked for is between Newtonville and Newton Center.

* * In a letter dated May 12, received recently from Athol, Mass., it is stated: "The New York parties who are expected to put capital into the electric railway, have been in town negotiating for a location for the central station. It is yet uncertain whether Athol or Orange will be chosen. The latest explanation of the delay in beginning work is that it is impossible to get the orders for electrical machinery filled quickly. One of the representatives of the company assured a party interested that the road would be running by July 15, but the people who take stock in this assertion are few. Evidently the road will not be built, if built at all, until the company gets ready. It is not improbable, however, that the plant will be stationed at Orange, and that the railroad company will do the town lighting.

Electric Omnibuses in London.

It will be remembered that we created a great deal of interest, not only in this country, but in America and on the Continent, by the announcement of the trial running of an electric omnibus in the streets of London, says the *Electrical Engineer*, of that city. We are now able to state that in a few weeks a line of electric omnibuses will be established, and commence running for passenger traffic as ordinary omnibuses without rails from Charing Cross to King's Cross. The route will be up Regent street and along the Euston road, so that the fashionable world as well as the workers will have a chance of seeing and riding in the cars. The omnibuses will have 16-foot bodies, much of the same size as the usual ones, but less in total length, taking in equal about half the length of the horses. Six inches more in seats will be allowed to each passenger, a comfort to be largely appreciated. Seats will be both inside and out, and 26 passengers will be carried in each. There will be six omnibuses on the route, and a charging station is being erected at King's Cross. The omnibuses are on the system devised by Mr. Radcliffe Ward and driven by accumulators. Electric delivery vans for heavy traffic will also, it is expected, be introduced, and charging stations will probably be erected at various convenient business centers. An electric butcher's cart is now practically finished, and has been constructed for and will be used by a well-known pork butcher.

Electric Launches at an English Boat Race.

The popularity of these launches was well evidenced by the general interest shown by the crowds of visitors. At the winning post at Mortlake, Messrs. Immisch & Company moored a charging station, and entertained a distinguished company on board their yacht, the "Viscountess Bury." Among those present were Professor and Mrs. George Forbes, Lord Wantage, the Countess Gleichen, Prince and Princess Victor, of Hohenstahe, and Viscount and Viscountess Bury. A number of short trips were made by the visitors in smaller launches to their perfect satisfaction. Messrs. Sargeant & Co., electric launch builders and engineers, Kent Bridge, had also a number of small launches on the river. The latter firm have just completed a specially designed electric sea-going pinnace, the "Pilot," for Mr. Pears, head of the largely advertised soap firm. It measures 26 feet six inches, by five feet four inches beam, and is constructed to carry 15 persons. Like the "Viscountess Bury" and the "Pioneer," and with the object of obtaining greater efficiency from the propeller of facilitating steering and reducing surface friction, there is no dead wood aft. Steering is done by the tiller, and the switch controlling the electric power is under control of the steersman, being flush with the after deck. Under the seats 40 E. P. S. accumulators are arranged in lead-lined compartments, and are estimated to hold sufficient energy with one charging to propel the boat eight hours with a rate of eight miles per hour. The motor, which is fixed under a center compartment in the boat, is calculated to develop three B horse-power at 700 revolutions per minute. As there is a clear space the whole length of the boat, there is none of the usual disagreeable odor nor oscillation commonly found with steam launches. *Apropos* of the boat race, the *Exchange Telegraph* successfully attempted for the first time to keep their subscribers informed of how the race was progressing, and a minute after the race was over the result was made known at 800 different places. The Manchester *Evening News*, giving a description of the race, was being sold in the streets of Manchester in less than a quarter of an hour after the race was ended.

Ozone at the Chemical Exhibition at Manchester.

On Tuesday, April 14th, a most useful institution, in the shape of a permanent chemical exhibition, was inaugurated at Manchester, and is described as follows in the London *Electrical Engineer:* The opening address was delivered by Mr. Ivan Levinstein, chairman of the Manchester Section of the Society of Chemical Industry, and chairman of the Chemical Committee of the Manchester Chamber of Commerce. The object of the exhibition, said the president, was not only the illustration, by specimens and otherwise, of the results of chemical operations and kindred processes, but also the illustration of the appliances necessary for arriving at these results in the best and most economical manner. In addition to bringing together the various exhibits of chemicals and products of a similar character and the necessary machinery for their production, the promoters have set aside in the building, for the convenience of visitors, writing-rooms, a smoke-room, lavatory, telephones, etc., with a view to facilitate the transaction of business and ultimately make use of this part of the building as a kind of chemical exchange, an idea which he hoped might be realized before long. Other useful attractions, such as a very comprehensive technical library, including a number of periodicals and trade catalogues, ought to assist in making the exhibition building a favorite meeting place of many who were interested in the chemical trade. Most of the exhibitors are specially connected with the chemical trade. We notice Messrs. Galloway and Mr. Joseph Aird show boilers and tubes, and other manufacturers present objects interesting to the chemical trade. Several exhibits of acids and other chemicals useful in electrical work are shown, and Messrs. C. R. Lindsey & Company, of Clayton, have a large exhibit of peroxide of lead. But perhaps the most novel and interesting exhibit is that of Mr. Ernst Fahrig, St. Helens Ozone Works, Plaistow, of ozonized products produced by the generation of ozone by means of electric currents. Esparto pulp is shown bleached by the ozone manufactured by this method. Where this agent is employed absolute whiteness and fixity is assured; in fact, an imperfectly bleached material will become whiter by standing, as though the residual ozone were slowly spending itself and gradually bleaching the fibres. Ozonized water is shown, suitable for killing microbes and for sterilizing purposes generally. Ozonized oil is used in medicine and in the preparation of linoleum and floor cloth. A further specimen shows what is called "ozone ammoniated lime," the peculiarity being that a considerable quantity of nitrogen is said to be fixed in combination with the line, and "ozone oxidized mangan," a high oxide of manganese, is formed by the action of ozone on a lower oxide. A bleached solution of sugar is shown, the liquor of which, before treatment with ozone, was jet black. The bleaching may be performed either before or after boiling, and is also applicable to dry sugar of all grades. We may mention that the electrical production of ozone in immense quantities, evidently capable of many important chemical applications, is receiving considerable attention from chemists and electricians, both in this country and on the continent.

* * Advices from the town of Newton, Mass., dated May 16, report as follows: One electric street railroad is being constructed through Newton's streets, another has been organized and will come before the aldermen next Monday, for a location between Newtonville and Newton Center, and now a third has been organized, the latter with a capital stock of $40,000, and which will also apply for a location somewhat similar to that desired by the Newton Center road. The name of the corporation is the Garden City Electric Street Railway Company and the storage battery system will be used. Among the subscribers are, A. R. Mitchell, J. H. Nickerson, Albert Plummer, W. H. Mendell, all of Newton; Hon. Mr. Alley, of Lynn, and Col. Hewins, of Boston.

Rapid Growth of a Chicago Electrical Supply House.

In May, 1889, Mr. Geo. Cutter, realizing that the electrical supply business was destined to take a very prominent position, and being confident that Chicago was a good point to operate from, he opened a supply house at 80 Adams street, occupying one-half of the second floor, with a floor space of 1,800 square feet.

The business from the start was good and rapidly increased as time went by. Soon the business demanded more room, and small storage quarters were secured in two different places, and still the business kept increasing, due wholly to Mr. Cutter's popularity and straight-forward business dealing, aided, no doubt, by his having the agency for a high grade insulated wire and other goods of equal reputation among the electrical fraternity. The fact, also, of Mr. Cutter's being a practical man and one well posted in electrical engineering, aided in building up his business.

Within the past two months Mr. Cutter found that in order to keep pace with his rapidly growing trade, a larger stock must be carried and larger quarters secured. In view of this fact, arrangements were made for the forming of the large syndicate which was perfected last week, and the present quarters leased to other parties, a new building being secured at 190 and 192 Fifth avenue, five stories in height, with 42 feet frontage and 90 feet deep. The entire building will be occupied by the new company, and will give them 18,900 square feet of floor space.

The company will be known as the Great Western Electrical Supply Company, and will carry a line of house, electric light and railway supplies; in fact, everything demanded in the electrical business.

The company will have the best of facilities for handling freight, and will fit their offices in the latest, modern style. Their motto will be good goods, low prices and prompt shipments.

A corps of capable men will fill positions in the house and on the road, while the management will be in Mr. Cutter's hands, which insures the new enterprise success.

Slightly Skeptical.

"Dr. Purcell Taylor presents his compliments to the editors of the (London) *Electrical Review*, and begs to say that he has succeeded in making a new insulating material having all the properties of gutta-percha but with a higher dielectric resistance. The new substance (called 'Purcellite') is very tough and elastic. It may be made any color, either flexible or rigid. A piece of iron covered with Purcellite was hammered out flat, and bent and twisted until it broke, without even cracking the insulating substance. Its cost is about $\frac{1}{10}$ that of gutta-percha." The above is a faithful copy of a missive sent to us, and will, doubtless, cause much consternation amongst wire coverers. It would have been, however, more to the purpose if Dr. Purcell Taylor, whoever that gentleman is, had sent us, say, a few hundred feet of wire, insulated by his newly discovered process. We could then have satisfied ourselves as to the pretensions he sets forth, which are not likely to be received amongst cable men in that credulous spirit for which the inventor doubtless hopes. We would suggest that he should introduce his ware to Mr. Ferranti.—*London Electrical Review.*

Validity of Telegram Stipulation.

The Supreme Court of Georgia held, in the case of Hill *vs.* Western Union Telegraph Company, says *Bradstreet's*, that where the blank upon which the sender of a telegraphic message wrote and signed the same had printed on its face the words, "The company will not be liable for damages in any case where the claim was not presented in writing within 60 days after sending the message," the sender was chargeable with knowledge of and assent to the terms and conditions thus indicated, that the stipulation was reasonable and obligatory, and that the agent or manager of the company on duty at the station from which the message was sent was a proper person upon whom to make demand for damages claimed, and was competent to recognize and act upon an oral demand and thus waive any writing.

A Complete Storage Battery Plant.

The Electrical Accumulator Company, through their Western agent, Mr. Wm. Hood, have just completed the installation of a storage battery plant in the Palmer House.

Some time ago the above company installed a like plant in Potter Palmer's castle on the lake, and the entire satisfaction given caused the second large order to be given. The installation was under the direct supervision of E. V. Baillard, the electrician for the Accumulator Company. The following is a detailed description of the plant, which consists of 120 cells of the 15L type Electrical Accumulator Company accumulators which are divided in three series of 40 cells each, giving a capacity of 1,000 ampere hours, at a normal rate of discharge of about 100 amperes. The dynamo used for charging is a U. S. dynamo, 225 amperes, 70 volts.

The dynamo and the accumulators are intended to take care of 385 lights placed in barber shop, ladies' and gentlemen's Turkish baths, laundry, halls and elevators. All these circuits, the dynamos and batteries, terminate at the switchboard, where any combination can be made. A voltmeter is arranged so the pressure can be measured between the various points of the system, also the E. M. F. of the battery. Each series of accumulators is provided with a switch by which the number of cells in series and the E. M. F. can be adjusted as desired, also a variable resistance so the current can also be varied as desired. An ammeter and a two-way switch are also in each series, thus making each series independent of each other.

The dynamo has an ammeter and a two-way switch, which enables running the dynamo direct, or to charge battery and supply lights. There is a pressure equalizer in the main lamp circuit. Between the dynamo and battery is an automatic break-switch which breaks current whenever, through any accident, the dynamo is incapacitated.

All these switches can be quickly and easily handled, and any combination made without in any way interfering with the steadiness of continuity of the lights. The combination which will be made each day is as follows:

At noon, the dynamo is started and run to supply lights and charge battery at the same time. When the load of lamps is equal to capacity of dynamo, the battery is cut out. As the load increases and becomes more than capacity of dynamo, the battery discharges and helps the dynamo, acting as an auxiliary. When the load decreases towards the latter part of the evening to less than capacity of dynamo, the battery is charged with the surplus.

At midnight, the dynamo is shut down, and the battery substituted to take care of the lights until noon next day. In this manner the lights are available for 24 hours, while the dynamo is run only 12 hours. By putting the current not needed for the lights in the battery, the dynamo and engine can be worked at a point near their maximum output, thereby obtaining the highest efficiency.

The switchboard is made up mainly of round and flat copper bars taped and painted with P. & B. compound, all held in place by porcelain insulators. Each cell of accumulators is placed on a tray supported on porcelain insulators and placed on battery stands of special construction, which enables each and every cell to be frequently and easily inspected, so the insulation of the plant is very high.

The equalizer is especially designed for this plant, and was made by the Franklin Electric Company.

—— Los Angeles, Cal., the beautiful "City of the Angels," is to have an electric lighting plant to use the Westinghouse alternate current system. The initial capacity of this plant will be 1,500 sixteen candle-power lamps, and the work of construction is to begin immediately. Los Angeles is in many respects an earthly paradise, but, of course, is not exempt from the darkness which visits every corner of the globe for a portion of each day. The capitalists of the city are wise to invest their money in furnishing electric illumination, and their enterprise will certainly be appreciated.

The Lodge Lightning Guard.

We are indebted to the London *Electrical Review* for the description of this new style of instrument.

The chief feature of Dr. Lodge's ingenious and beautifully simple device for protecting cables and electrical apparatus from injury by lightning and high-tension discharges in general, consists in placing a *number* of air gaps, or their equivalent, between the line and the apparatus to be protected. This principle, of course, admits of a variety of practical solutions, and in Fig. 1 we have a diagramatic representation of one of the methods proposed by Dr. Lodge. L and E are terminals connected, respectively, with the line and with earth. T_1T_2 are terminals in connection with the instrument to be protected. A_1, A_2, A_3, A_4 are air gaps, and S_1S_1, S_2S_2, S_3S_3, are impedance coils. The air gaps, it will be observed, decrease in width, and the wire composing the coils becomes gradually finer. The broad effect of this particular arrangement, which we hasten to add is not greatly insisted on by its author, is to present an increasingly difficult path to the discharge in the direction of the instrument which it is required

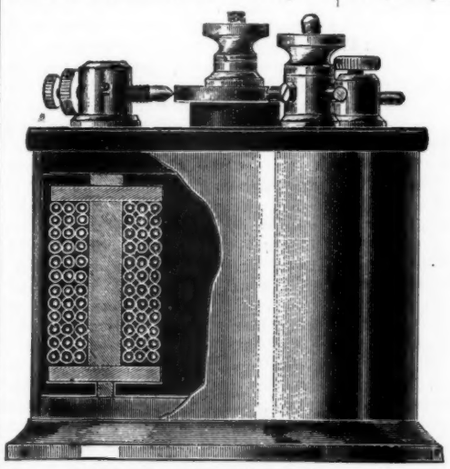


FIG. 2.—THE LODGE LIGHTNING GUARD (CIRCULAR PATTERN.)

to protect, and an increasingly easy path to earth. The coils may be composed of the same wire throughout, the air gaps may be of the same width and the terminals may be connected up in a variety of ways. A lightning conductor of this form, it is obvious, offers great self-induction on the one hand, and dielectric weakness on the other, to the lightning, and air-resistance obstruction on the one hand, and thick wire conduction on the other, to the useful current. The superiority of this device over ordinary single air-gap protectors, at any rate in the case of powerful discharges from a large Wimshurst machine, is most marked. It is unnecessary

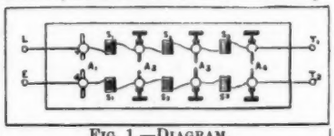


FIG. 1.—DIAGRAM.

to add that the self-induction of the coils is inappreciable for ordinary currents, and that they contain no iron cores. In Fig. 2 we have a perspective view and in Fig. 3 a diagram of the connections of an actual protector of the circular pattern, as constructed by Dr. Alexander Muirhead. The central boss is connected to the brass case by means of a rod down the center. Underneath, in the base of the instrument, is a screw to which a direct connection with the earth is made. The screw on the central boss at the top is only used when a handy earth is wanted for an instrument. The first projecting rod is of platinum, the second of brass, and the remaining three are of copper. This arrangement, it will be seen, is equivalent to that shown in Fig. 1, with the lower row of coils omitted.

The Thomson Electric Welding Company, it is said, has over 100 machines out on royalty and is at work on 15 or 20 more, and, although it has increased its plant largely, has orders ahead for more than six months' work. The royalties on the machines already out would pay a very handsome dividend, and it is reported that valuable "rights" will soon be given to the stockholders.

Long Life of the Perkins Lamp.

TO THE EDITOR OF ELECTRICAL REVIEW:

In your issue of May 10, under the head of "A Long-Lived Lamp," you note a Sawyer Man lamp which had been running 7,980 hours. In a report received some time ago from the Forest Paper Company, of Yarmouthville, Me., who are using the Perkins lamps and have kept a very careful record of the number of hours burned by each, we find the following:

Among the lamps that had burned out, one had burned between 8,000 and 8,500 hours; five between 9,500 and 10,000 hours, and two over 10,000 hours. Of the lamps still burning four had burned over 9,500 hours, and one over 10,000 hours. Can any one beat this record?

Yours truly,
The Mather Electric Company,
WM. A. ANTHONY.

Manchester, Conn., May 15.

GENERAL NOTES.

The output of copper from the Calumet mine last week was 841 tons.

A new copper wire direct from New York, has just been connected to the Atlanta office of the Postal Telegraph Company.

The people of Newport, R. I., must be a queer lot. Anything electrical seems to set 'em a boiling. Last summer they objected to an electric railway; now it's the telephone poles which displease them.

F. J. Sprague, of the Sprague Electric Company; John Muir, business manager of the Sprague Company; Charles Lieb, consulting engineer of the Edison Company; John Kruese, Arthur Taylor and Tyler Woodward, all electrical men, were in Pittsburgh last week.

Mr. Fred. W. Royce was a recent visitor to New York, attending the opening at the Brooklyn navy yard of the new "dry" dock, the name of the dock proving a special attraction. Mr. Royce is engaged in working out a number of new inventions, and while in this city received two "Irish dividends" from the companies handling them.

Las Vegas, New Mexico, might be called an out of the way town, but, evidently, it would be unjust to charge the citizens of the place with lack of enterprise. A com-

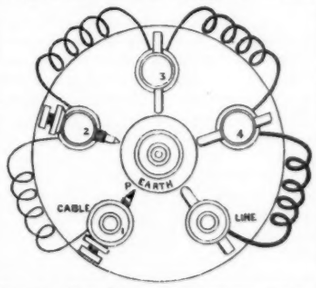


FIG. 3.—THE LODGE LIGHTNING GUARD (CIRCULAR PATTERN). — DIAGRAM OF CONNECTIONS.

pany has been formed there to go into the electric lighting business, and a representative of the Westinghouse Electric Company recently sold to it a 500 light incandescent machine of his company's manufacture, together with one of the new alternate current arc lighting dynamos of 40 lights capacity.

Through telegraphic communication was established between New York City and Nicaragua, last week. The first message came from Greytown. The route of the telegram was by the Nicaragua Canal Company's lines to Castillo, on the San Juan River, thence by the Nicaragua government lines to San Juan del Sur on the Pacific, where these connect with the Central and South American Cable Company's system, thence by cable to Salina Cruz on the west coast of Mexico, by land wire across the Isthmus of Tehuantepec to Coatzacoalcos, and by cable to Vera Cruz, thence by the Mexican Telegraph Company's cable to Galveston and over the Western Union wires to New York.

ELECTRIC LIGHT NEWS

—— The Blacksburg Land and Improvement Company have contracted with the new city council to furnish electric lights for the city.

—— The electric lighting business at New Haven, Conn., is assuming such proportions that a new station is to be put in for the furnishing of light to the lower half of the city.

—— An amendment to the certificate of incorporation of the Southern Electric Company has been filed for record in Baltimore. By the amendment, the name is changed to the Maryland Electric Company.

—— Southern office of Thomson-Houston Electric Light Company report sale of a 30 arc light plant to the Roan Iron Company, of Rockwood, Tenn., and also a 500 light incandescent plant for Opera house in Memphis, Tenn.

—— The Youngstown, Pa., Electric Light Company has closed a contract with the Westinghouse Company, of Pittsburgh, for the purchase of five dynamos and other electrical apparatus. It expects to have its plant running in 90 days.

—— There is great rejoicing among the East Providence people over the fact that the contract has at last been signed by the town council for the lighting of the streets with electric lights by the Narragansett Electric Light Company, of Providence.

—— James F. Cummings, superintendent of construction, of the Edison Electric Light Company, of New York, is in Milwaukee for the purpose of superintending the erection of the company's plant in that city. The company expects to have it completed in about three months.

—— The Salt Lake City Electric Light Company has closed a contract with the Thomson-Houston Company for an additional plant, to cost in the neighborhood of $20,000. This plant will have a capacity for 2,500 incandescent lights. In addition to this, the company will add motor power to cost some $25,000.

—— The Laclede Gas Light Company, of St. Louis, was notified by Mayor Noonan, last week, that the Municipal Electric Lighting Company's plant is working satisfactorily, and that it will be unneccessary for the gas company to keep its force of gas lighters and other employés who attend to the street lamps, in service any longer.

—— Mr. Robert Triplett, a Pittsburgh young man belonging to the class which Mr. Carnegie says are bound to succeed, is working on a new electric light globe. He got his idea in a seaside lighthouse last summer, and claims that if he can carry it out he will increase the electric light's power 100 per cent. and do away with frosted globes.

—— The Selectmen of Brookline have granted the Brookline Gaslight Company permission to erect 18 poles on Washington street for its Brighton electric circuit. There will be a hearing in the Town Hall, Brookline, May 14, on the petition of the West End Street Railway for location for a double track on Chestnut Hill avenue, with single trolley system motive power, also for leave to lay tracks with suitable curving to enter a stable about to be erected on the White estate.

—— The burning of the Taunton, Massachusetts, Electric Light Company's plant will keep the city in darkness for a short period. As soon as the insurance is adjusted the company will at once build a new plant. The machinery was damaged considerably, but two out of the six dynamos are in a fair condition, and it is expected to have them running in a few days. An expert from New York is on his way to examine the other machines, and if possible repair them. The company was insured for $7,500, being $3,000 less than the loss.

ELECTRIC CLUBS.

VISITORS AT THE NEW YORK CLUB—THE BOSTON CLUB ENTERTAINING THE ELECTRICAL ENGINEERS—MEETING AT KANSAS CITY.

New York Electric Club.

Mr. Geo. T. Manson, member of the committee on membership, returned to the city last week after an extended visit to the Pacific Coast, in the city of Sabinville, generally known as San Francisco. The adventures of the traveler have been listened to by an admiring and attentive audience, and are only paralleled by the experiences of Mr. Telephone Doolittle, who recently returned from the Golden Gate. In one respect Mr. Manson's experience dwarfs the other, for one morning about 4 o'clock (just after he had retired!) the Palace Hotel was severely shaken with a regular old-time California earthquake. Mr. Manson's description of how he was thrown first against the wall on one side and then back to the middle of the room, and from there suddenly hoisted to the ceiling where his head made a hole in the woodwork, was a very vivid one, and his friends congratulated him on his escape alive. Although badly shaken the hotel did not fall, and no lives were lost, yet many were nearly scared to death—excepting, of course, the Electric Club representative.

Mr. W. H. McKinlock, of Chicago, is visiting New York, with headquarters at the Electric Club.

In Proof of the fact that Electric Club men are great travelers, a recent committee was to meet at its usual time recently, when, on counting noses, it was found that one member was in Paris, one in San Francisco, one in Washington, one in Pittsburgh, and, last, one in New York. The committee adjourned without action.

New York Electrical Society.

On Thursday evening, May 15, the society held its annual meeting at Columbia College. The following officers were elected: F. B. Crocker, president; Joseph Wetzler, Francis Forbes, G. H. Stockbridge, T. C. Martin, Dr. Otto A. Moses, E. L. Bradley, vice-presidents; Geo. H. Guy, secretary; H. A. Sinclair, treasurer; C. O. Mailloux, Joseph Wetzler and F. B. Crocker, trustees.

The secretary's report showed the number of members now on the roll to be 250. During the past year 36 new members were admitted. A number of valuable and entertaining papers have been read, due mention of which has been made in these columns.

At a special meeting of the executive committee, the following, after careful consideration, was adopted:

"*Resolved*, That the New York Electrical Society, through its officers and trustees, hereby severs its connection with the American Institute, and resumes all its functions of self-government and independence of action."

After the business meeting, Mr. J. J. Carty, of the Metropolitan Telephone and Telegraph Company, delivered a lecture on "Telephone Engineering," which appears in another place in this issue.

Boston Electric Club.

Secretary R. F. Ross has returned to the city after an extended business trip through New York and Pennsylvania, where he has been looking after the interests of *Modern Light and Heat*.

Col. C. M. Ransom has been quite sick at his residence, at Newton Centre, Mass., for about two weeks, causing considerable anxiety among his many friends. Colonel Ransom's health has been rapidly improving for several days past, and no doubt he will soon be able to attend to business and visit the Club.

Mr. H. M. Daggett, of North Attleboro, Mass., the indefatigable manager of the Attleboro Electric Light Company, and promoter of other electrical enterprises, has been recreating at the "Hub" most of the week. The Club rooms have proven a center of attraction to Mr. Daggett each evening of his sojourn in the city.

New Members.—There were 11 new members elected at the monthly meeting on Monday evening, May 5, instead of seven, as erroneously stated in last week's issue.

Dinner to the Electrical Engineers.—On Wednesday evening, May 21, as previously announced in these columns, the Club gives a dinner to the American Institute of Electrical Engineers. The dinner will take place at the Parker House; and it is expected that there will be present about 200 gentlemen. The Club's House and Entertainment Committee are already at work making arrangements for the coming event, which will undoubtedly prove not only a successful but a very enjoyable affair; and will certainly reflect much credit on the Boston Electric Club.

Chicago Electric Club.

The Strike of the waiters at Kinsleys' restaurant the past ten days has affected the dining services of the Club.

The Following Named Gentlemen registered at the Club within the past two weeks: G. M. Peters and C. M. Peck, Cincinnati, O.; W. H. Lukins, Streator, Ill.; W. H. Gillett, New York; Ely S. Wave and Chas. S. Wave, Cedar Rapids, Ia.; J. F. Cummings, New York; W. H. McCarty, Minneapolis, Minn.; E. D. Stiles, W. A. Stiles, David Highland and J. F. Phillips, Chicago; F. B. Brown, Kansas City.

The New Bookcase for the reading-room has been placed in position, and is a great addition to the room.

At the Regular Meeting of the Club, on Monday evening, Mr. J. K. Pumpelly will read a paper entitled "Practical Application of Storage Batteries to Car Traction Work and Lighting Installations."

Kansas City Electrical Society.

An Interesting and Instructive Meeting was held by the Kansas City Electrical Society, last week. There was considerable discussion on the subject of electrical insulation for electric light wires and the erection of other wires adjacent to them. The opinion of the society was that a city inspector of wires, the insulation and manner of erection, is absolutely necessary for the protection of the various interests involved from high pressure electric light wires, and the society appointed the following committee to draw up an ordinance to present to the council for the appointment of an electrical inspector: T. F. Clohesy, A. M. Barron and W. H. Woodring. Prof. A. Barrett presented a drawing and explained at length his improvement on the Hale fire alarm system, whereby an alarm is transmitted directly to the fire department and registered automatically in addition to the telephone service—one acting as a check on the other and allowing for two channels to transmit the alarm. His system, though quite complicated, appears well theoretically. It is proposed to offer the system to the city shortly.

Atlanta Electric Club.

The Atlanta Electric Club, Atlanta, has finished decorating and painting the new quarters, and will begin furnishing this week. The Club will be supplied with incandescent light, telephone, telegraph instruments, phonograph and phonograph-graphophone, and other electrical apparatus donated by their friends; billiard and pool tables will be placed in the lecture hall. The Club membership is increasing.

Fort Wayne Electric Club.

The Electric Club, of Fort Wayne, Ind., although still in its infancy, is constantly growing in membership, and extending its influence. Its president, Charles C. Miller, announces that it "expects to do as good work as any organization of this kind can do." The Club now has a membership of 150, and has secured comfortable Club rooms.

Not While the Office Boy Obtains.

"An Eastern man claims to have invented an anti-profanity fountain pen," remarked the horse editor.

"If it could be followed by a strictly moral telephone," replied the snake editor, "we might have some hope for the business men of the nation."—*Pittsburgh Chronicle.*

The Frankfort Exhibition.

The holding of an International Electrical Exhibition in Frankfort-on-the-Main, next year, has recently become assured, we are told, by the New York *Sun*. The committees in charge of the undertaking have outlined most of their plans, and have received offers of aid in executing them from all the great German authorities, who range between Chancellor von Caprivi and Burgermeister Miguel. At a large meeting of German electricians in Frankfort recently, Herr Oscar von Miller, a director of the coming exposition, described, at some length, its principal features.

"The object of the exposition will be," he said, "to illustrate the various systems and methods of transmission and distribution of electricity. Just this period of time, in which the tendency toward shorter hours of labor clashes with the tendency toward a fuller and more comfortable material life, is especially favorable to our enterprise. We must seek out new sources of power, which will enable us to produce more commodities with less human effort. We must reveal these sources to employers and employed, and thus teach them to become the apostles of the new industrial era of electricity. Part of the electrical power used in the exhibition will be transmitted from great distances, so that the spectators may learn the possibilities of transmission. Another part of the power will be produced in the exhibition rooms. We will have extraordinary power at our disposal, and will utilize it in machines of greater size, nicety and variety, than have ever before been brought together. We will make a specialty of electric railways. We shall exhibit at least four different systems. One will be an underground freight railway for use in mines, and will be a section of an exposition of electrical mining appliances calculated to relieve the miner's life of many of its present discomforts and dangers. Another railway having the storage system will run from the exposition to the Schiller square. A third railway, from the exposition to the Opera square, will have the air line conductor; and a fourth, from the exposition to the Main, will be an underground concern for the purpose of transporting persons to our electrical marine exhibit on the river side. In the exposition theatre popular lectures, accompanied by electrical experiments, will be held daily. A great electric light tower on the Main will be made by means of an enormous reflector to keep throughout the night the river side of the city as light as day.

"We shall seek next year to have all the scientific and technical congresses select Frankfort for their convention. Dr. Miguel (Mayor of Frankfort) will call a convention here of representatives of city governments, which, of course, have the greatest interest in electric lighting problems. We, of the executive committee, have resolved to call together here from all countries an investigating commission of the most famous electricians, who shall test and give judgment on the practicability of the exhibits."

Herr von Miller also explained the arrangements made for showing all the latest improvements and possibilities of telephones, phonographs, electric lighting, and the progress of all three since the exhibition in Paris.

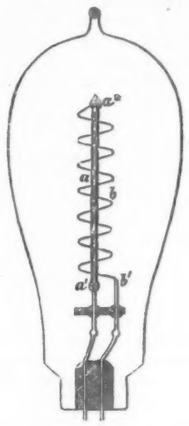
International Telegraph Conference.

The International Telegraph Conference opened in Paris on May 16th. One hundred and seventeen delegates were present. M. Roche, Minister of Commerce, made the address of welcome. He reviewed the developments in telegraphy and telephony, and predicted that the deliberations of the conference would result in further improvements, and would serve to draw closer and tighter the bonds of peace between nations.

The city of Lancaster, Pa., brought suit against the Edison Electric Light Company, to recover the tax of 50 cents per pole imposed by ordinance. Saturday, Judge Livingston decided that the company must pay the tax and the penalty. The case will be appealed to the Supreme Court, on the ground that the electric company paid the tax to the State.

A New Incandescent Lamp.

Langhan & Company, of Berlin, have just patented a new lamp, the principal feature of which is the vertical prop, *a*, supporting the incandescent spiral, *b*. This prop is connected at a^1 with one of the two electrodes, and at a^2 with the spiral which joins the other electrode at b^1. It consists of a core and envelope, the latter being



formed of two metals or alloys, whose coefficient of expansion differs. The heat caused by radiation occasions a difference in expansion between the core and envelope and the internal tensions, the result being the suppression of all lateral flexion. We are indebted to our English namesake for this description.

Largest Boiler in the World.

At an electric lighting station on West Twenty-fourth street, the largest boiler in the world was tested last week. It is incased in a vertical shell three-quarters of an inch thick, and gives an assurance of safety of ten under a working pressure of 200 pounds. The tubes number 600 and are three inches in diameter. Their length, if stretched out, would reach 7,200 feet, or almost 1½ miles. They are twisted and penetrate the cylinder 1½ feet higher than the level from which they start. There is also an inner cylinder, which runs a short distance below the normal water level. It is open at the upper end, and short tubes lead it to the lower ends of the twisted tubes, into which they fit loosely. The feed water goes into the inner cylinder and thence goes to the twisted tubes. In these rapid circulation is obtained because of its upward tendency and the fierce heat surrounding the tubes. The discharge of water and steam goes into the space between the inner and outward cylinders. The rapid circulation is downward in the inner cylinder and upward in the intermediate space.

Sediment finds a settling place in a portion of the central drum below the fire level. This can be reached by a manhole. As it is simple in construction and without braces, it can be easily and readily cleaned.

Any water carried by the steam in the main cylinder is thrown back by a deflector plate, inserted a short distance above the water level. The steam leaving the boiler is forced into a number of heating tubes in the upper portion of the boiler, and becomes thoroughly dried or superheated.

The fire-box is enclosed in a casting of iron, bolted together and lined with a fire-brick. Fed with a "hopper," a revolving grate at one door is used. The boiler above the fire-box is so incased that it can be removed in sections, without disturbing the other parts. This is of great value in that it permits an inspection or repair of the interior in parts.

The heating surface evaporates with a rate of combustion of 125 pounds of coal per square foot of grate per hour, six pounds of water per square foot of heating surface per hour requiring only five square feet of heating surface per horse-power, on a basis of 30 pounds of water per horse-power and per hour. The whole boiler contains 6,000 square feet of heating surface, and is of 1,000 horse-power. One hundred square feet is the area of the grate surface, being in the ratio of 60 for heating to one of grate surface, thus reducing escaping gases to the lowest practical temperature. Another of these boilers is now in course of construction.—*New York Star.*

KINDRED INTERESTS

The Standard Electric Company, of Vermont, have put in over 40 plants during the past year, aggregating 10,450 lamps.

The Eastern Electric Cable Company, of Boston, have issued price list No. 7 of the Clark wire and cables. The pamphlet also contains valuable information in the shape of tables and formulæ.

The National Pipe Bending Co., New Haven, Conn., have sent out a good lithograph of their feed water heater, which shows the interior construction as well as an exterior view. Over 300,000 horse-power are in use at the present time.

H. E. & C. Baxter, 18 Fulton street, Brooklyn, have issued a new catalogue of their electrical goods. The illustrations show a large and pleasing variety of annunciators, electric bells, push buttons and general domestic electrical supplies.

The Westinghouse Electric Co., of Pittsburgh, have sent forth a very handsome and artistic pamphlet, describing their new system of arc lighting by the alternating current. The flat carbon lamp and the new adaptation of the dynamo are mentioned in detail.

The Gate City Electrical Supply and Construction Company, a newly organized company at Atlanta, Ga., have recently received two tons of Okonite wire and material. They report a recent sale of a 50 light private plant, the "Kester" system. Their new illustrated catalogue is complete and attractive in all its details. Their line of supplies is as extensive as carried by the large electrical houses in the country.

The Pope Electric Clock Company, 94 and 96 Nassau street, have recently put upon the market an electric clock which claims to be a true time keeper. The clock is independent; that is, it is not one of many on a circuit, but is run by a single cell of battery. The pendulum is a vibrating elastic plate or reed, is isochronous, and describes a cycloidal arc in swinging. This pendulum is made to drive the clock directly. The clocks are sold outright.

The Pennsylvania Limited stands first among the railroad trains of the world in the degree of luxury and comfort afforded its patrons. The ladies' waiting-maids, the stenographers, the financial reports and the observation car, are features entirely original and unique with this train. The superb accommodations of the other cars, great speed and prompt movement, fill every demand of the traveler. The Limited leaves New York stations, foot of Desbrosses and Cortlandt streets, every day, at 10 A. M., for Cincinnati and Chicago.

The Wainwright Manufacturing Company of Massachusetts report the following additional sales of their improved heaters and condensers, sold under a 10 years' guarantee: Russell, Boynton & Company, Minneapolis, Minn., one 50 h. p.; Perrin & Seamans, Boston, Mass., one 50 h. p.; James Rees, Pittsburgh, Pa., one 25 h. p.; New York Safety Power Co., New York, N. Y., three 100 h. p.; N. S. Walker, Chicago, Ill., one 75 h. p.; P. & F. Corbin, New Britain, Conn., one 100 h. p.; Haynes Palace Car Co., Buffalo, N. Y., one 400 h. p.; Gorham Manufacturing Co., Providence, R. I., one 400 h. p.; C. F. Smith, Pittsburgh, Pa., two 15 h. p.; H. S. Walker, Chicago, Ill., one 75 h. p.; Chicago Steam Heating Company, Chicago, Ill., one 100 h. p.; H. S. Walker, Chicago, Ill., one 60 h. p.; Ætna Powder Co., Millers, Ind., one 25 h. p.; E. O. Knoght, Worcester, Mass., one 30 h. p.; H. S. Walker, Chicago, Ill., one 60 h. p.; Southern Pavement Co., Fort Payne, Ala., one 100 h. p.; Rutland Electric Light Co., Rutland, Vt., one 300 h. p.; Diamond Ice Co., Roanoke, Va., one 100 h. p.; Frazier & Co., New York, N. Y., one 300 h. p.; H. S. Walker, Chicago, Ill., one 300 h. p.; H. Disston & Sons, Chicago, Ill., one 100 h. p.; J. E. Hubbard, Greenfield, Mass., one 75 h. p.; H. S. Walker, Chicago, Ill., one 30 h. p.; H. S. Walker, Chicago, Ill., one 125 h. p.; W. H. Cook, Chicago, Ill., one 100 h. p.; Buckeye Engine Co., Salem, Ohio, one 80 h. p.; Buckeye Engine Co., Salem, Ohio, one 60 h. p.; H. W. Petrie, Brantford, Canada, one 25 h. p.; Detroit Electric Co., Detroit, Mich., one 300 h. p.

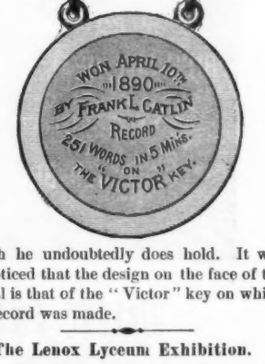
Removal Notice.

Dayton, Hall & Avery, of Portland, Ore., have moved to 204 and 206 Front street, temporary quarters near their old stand, as they are erecting a fine modern three story brick building, 55x100 feet, at the location they have occupied for the past 13 years. The building will be called the "Wildwood" and will be ready for their occupancy early in the fall.

Prize for Fast and Good Telegraphic Work.

Our illustrations show the handsome prize presented by the New York *World* to the winner in Class "B," in the recent fast send-

ing telegraph tournament. The winner was Frank L. Catlin, the son of the manager of the tournament. He is quite a young man to hold the high position among fast senders



which he undoubtedly does hold. It will be noticed that the design on the face of the medal is that of the "Victor" key on which the record was made.

The Lenox Lyceum Exhibition.

On Thursday evening, May 15, the exhibition at the Lenox Lyceum, in this city, closed in a blaze of light. Manager De Frece had provided an especially interesting musical programme, which was appreciated by the large number of society people who had secured boxes for the closing night. Some new lighting effects were also shown. It is understood that the exhibition has been a financial success, which speaks well for the managers. Every one is agreed that such an exhibit of electrical wonders was never seen before. Those who missed the exhibit will now regret it.

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ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON MAY 13, 1890.

427,540 Lightning arrester. 427,541 System of electrical distribution; Louis Bell, Lafayette, Ind.
427,549 Electric prod-pole; John M. Burton, Wichita, Kan.
427,569 Trolley-arm for electric cars; Wm. F. Harriman, Des Moines, Iowa.
427,571 Alternating current apparatus; Edward Heymann and Frank W. Heymann, Boston, assignors to James E. Maynadin, trustee, Taunton, Mass.
427,574 Electric heater; Benjamin C. Howard, Baltimore, Md.
427,575 Lubricator; Edward Huber, Marion, O.
427,606 Electro-magnet; Francis J. Patten, New York, N. Y.
427,621 Multiple switchboard test system. 427,622 Switchboard. 427,623 Test circuit for multiple switchboards. 427,624 Multiple switchboard test circuit. 427,917 Multiple switchboard; Chas. E. Scribner, Chicago, Ill., assignor to the Western Electric Co., same place.
427,628 Trolley or collector wheel for electric railways; Sidney H. Short, Cleveland, Ohio.
427,674 Carbon brush for motors; Leo Daft, Plainfield, N. J., assignor to the Daft Electric Light Company, New York, N. Y.
427,681 Electro-matrix machine; Geo. A. Goodson, Minneapolis, Minn., assignor to the Minneapolis Electro-Matrix Co., same place.
427,682 Art of forming matrices for stereotype plates; Geo. A. Goodson, Alexander S. Capehart and Chas. L. Travis, Minneapolis, Minn., assignors to the Minneapolis Electro-Matrix Co., same place.
427,710 Composition for supports for secondary battery electrodes; Walter F. Smith, Philadelphia, Pa., assignor to the United Electric Improvement Co., Gloucester City, N. J.
427,724 Automatic electric cut-out. 427,725 Electric railway. 427,726 Contact device for electric railways; Edw. M. Bentley, New York, N. Y.
427,742 Telephone exchange apparatus; John J. Carty, New York, N. Y., assignor to the Western Electric Co., Chicago, Ill.
427,746 Electrical conductor for the transmission of power; William J. Cordley, Richmond, Va., assignor of one-half to Walter D. Moses, same place.
427,748 Electric meter. 427,749 Method of measuring and registering electric energy; Stanley C. C. Currie, Philadelphia, Pa., assignor to the United Electric Improvement Co., Gloucester City, N. J.
427,751 Electrical converter; Sebastian Z. de Ferranti, Hampstead, County of Middlesex, England.
427,762 Electric signal; Josef Hass, Jr., Vienna, Austria-Hungary.
427,781 Electro-pneumatic clock system; Carl A. Mayrhofer, Berlin, Germany, assignor by mesne assignments to the Electro-Pneumatic Time Co., New York, N. Y.
427,783 Electric circuit closer for railway signals; Frank E. Morgan and Frederic A. Lane, New Haven, Conn.
427,785 Secondary battery electrode; James F. McLaughlin, Philadelphia, Pa.
427,789 Secondary battery; Thos. F. Nevins, Brooklyn, N. Y., assignor of one-half to John W. Carter and Harry Carey, both of same place.
427,876 Telegraph key; John S. Naylor, Bismarck, Ill.
427,878 Guard and stay for electric railway wires; Conrad J. Kilian, Milwaukee, Wis.
427,879 Electric indicator; Frederic A. Lane, New Haven, Conn., assignor to the New Haven Clock Co., same place.
427,951 Incandescent electric light bulb; Thos. B. Atterbury, Pittsburgh, Pa.
427,953 Electric train-signaling apparatus for railways; Eugene J. J. De Baillehache, Paris, France.
427,955 Spark arrester; Joseph S. Bell, Allegheny, Pa.
427,966 Motor car; Geo. M. Brill and John A. Brill, Philadelphia, Pa.
427,971 Method of electric welding; Chas. L. Coffin, Detroit, Mich.
427,974 Means for effecting communication in telephone systems; Louis J. Crossley and Walter Emmott, Halifax, and John F. Harrison, Bradford County of York, England.
427,978 Alternating current motor; Michael Von Dolèvo-Dobrowolsky, Berlin, Germany, assignor to the Company Allgemeine Elektricitats-Gesellschaft, same place.
427,984 Automatic lightning arrester; Claude M. Griffin, Kansas City, Kan.
427,986 Lantern for electric arc lights; John W. Gwynn, Bucyruss, Ohio, assignor of four-fifths to J. B. Gormley, Robt. Mandsley, Mary Blanch Lemert and Kate E. Lemert, all of same place.
428,008 Arc lamp; Philip Lange, Pittsburgh, Pa., assignor to the Westinghouse Electric Co., same place.
428,030 Electrical target trap; James Wolstencroft and William H. Soley, Philadelphia, Pa.
428,038 Commutator brush; Evan H. Bowen, Akron, Ohio, assignor of two-thirds to Lewis A. Smith and John Henry Kruse, same place.
428,042 Method of producing alternating electric currents; Mahlon S. Conley, Hyde Park, assignor of two-thirds to William B. Sterrett, Chicago, and John F. Weare, Hyde Park, Ill.
428,046 Terminal for electric cables; Joseph A. Hanagin, Chicago, Ill., assignor to the Western Electric Co., same place.
428,050 Ground detector; Chas. H. Macloskie, Allegheny, Pa., assignor to the Thomson-Houston Electric Co., of Connecticut.
428,055 Manufacture of telegraph cables; William R. Patterson, Chicago, Ill.
428,057 Pyromagneto-electric generator; Nicola Tesla, New York, N. Y., assignor of one-half to Chas. F. Peck, Englewood, N. J.

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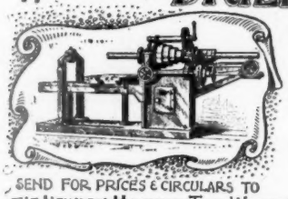

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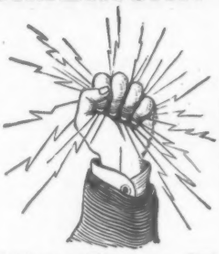

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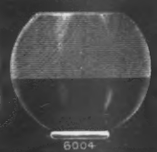
GLOBES  **SHADES**

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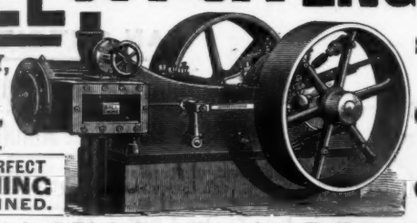

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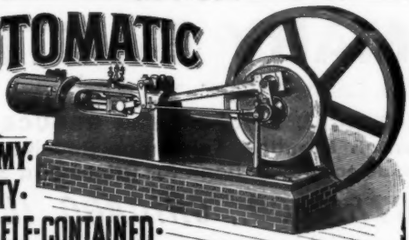

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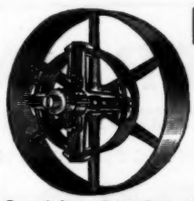

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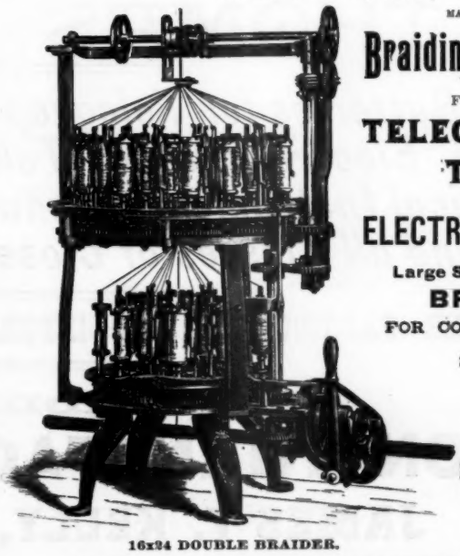

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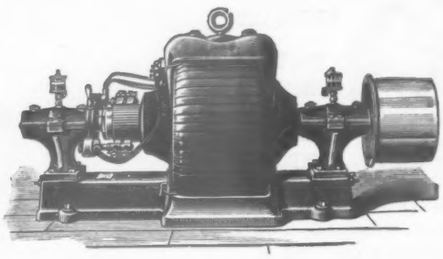

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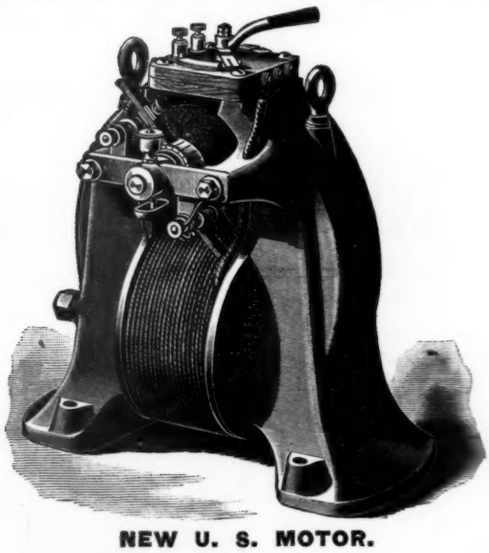

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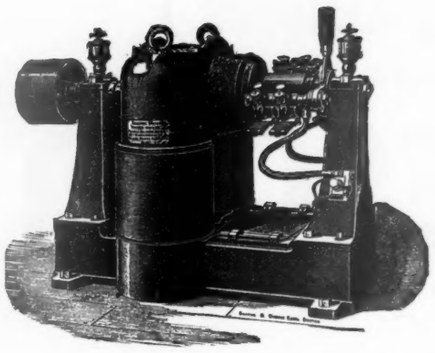

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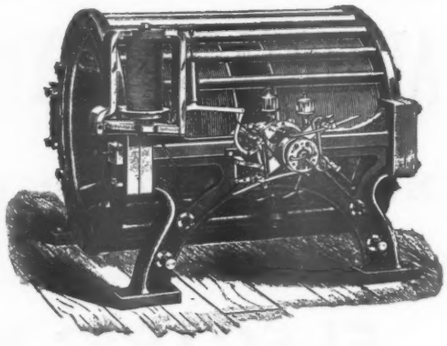

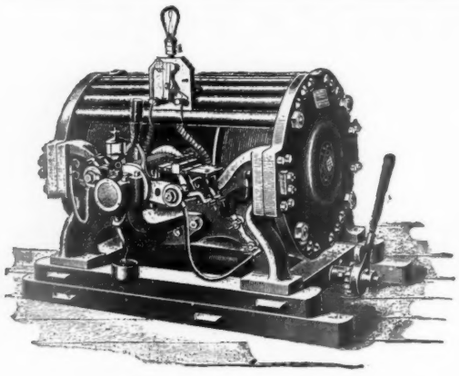

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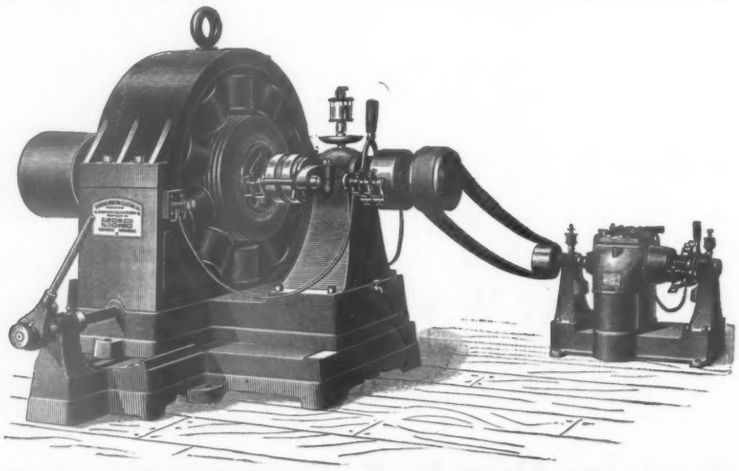

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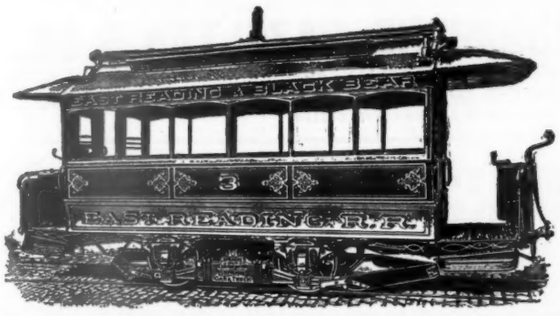

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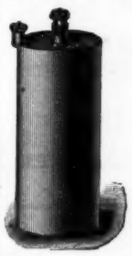

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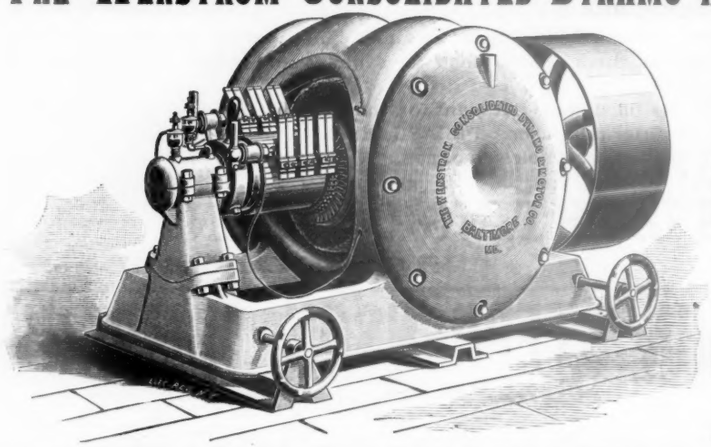

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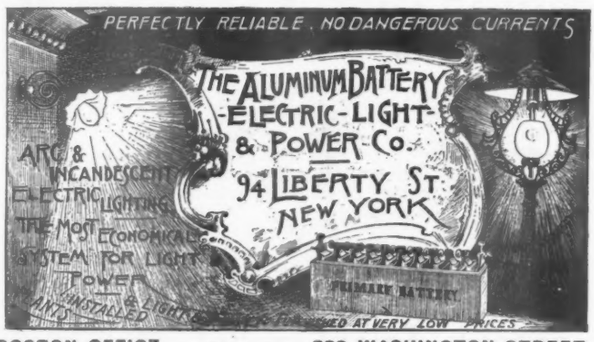

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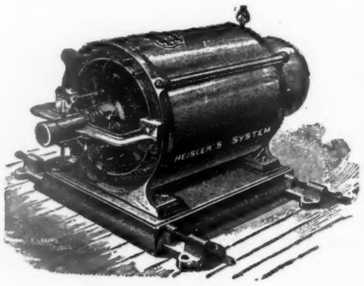

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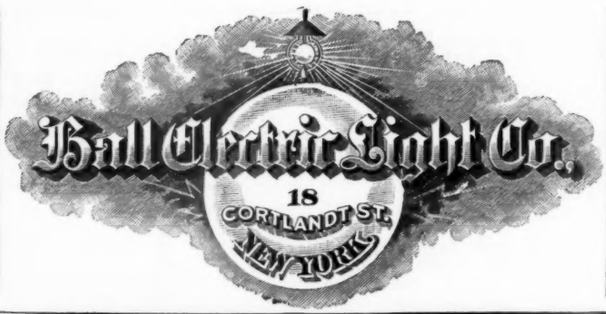
							5,000 FEET PER MINUTE.	
C	8				6.5	1¼		530
		10			6.3	1½		530
C				25	8.0	2		530
	16				12.0	2½		780
C		20			12.5	2½		780
			36		13.0	2½		780
C	20				15.0	3		990
		25			15.6	3		990
C			32		15.0	3		990
				50	16.0	3		990
C	28				21.0	4½		1,360



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							5,000 FEET PER MINUTE.	
C		35			21.0	4		1,360
C			45		21.0	4		1,360
C				70	21.0	4½		1,360
C	40				29.7	6		1,750
C		50			30.0	6		1,750
C			64		29.5	6		1,750
C	52				38.0	8		2,290
C		65			38.6	8		2,290
C			83		38.0	8		2,290
C	64				46.5	10		2,770
C		80			47.1	10		2,770
C	75				52.5	12		3,200

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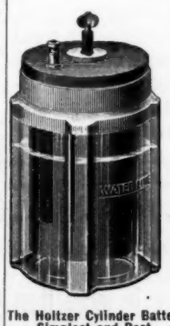

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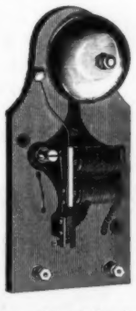

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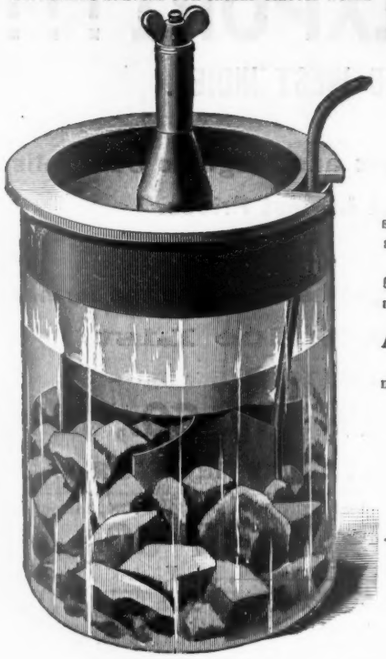

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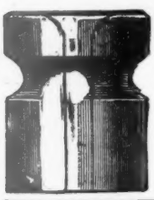

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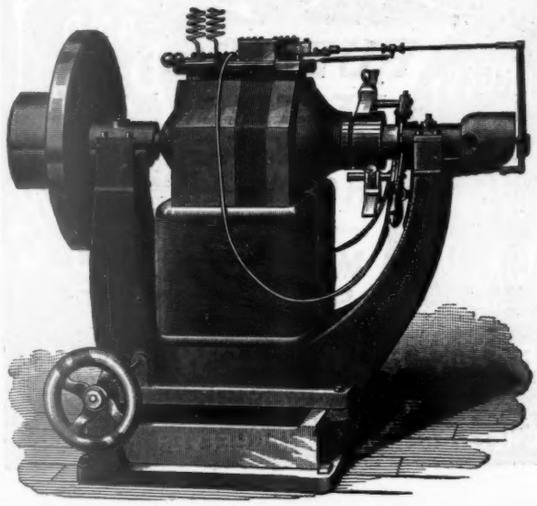

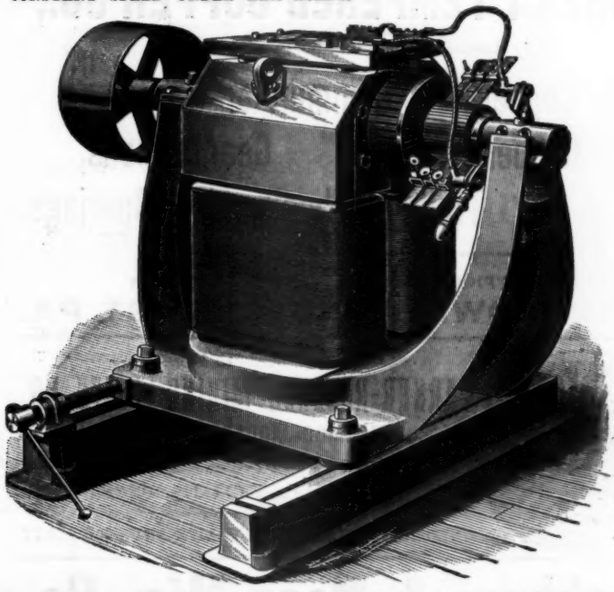

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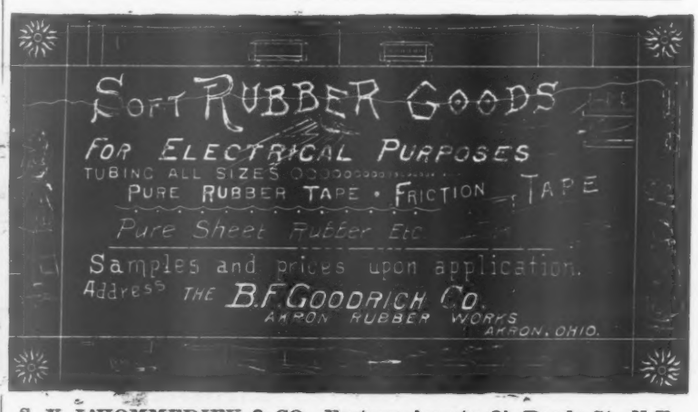

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Fig. 1 represents Copper Tee used for branching from main cables, as shown in Fig. 2.

FIG. 2.

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FIG. 3.

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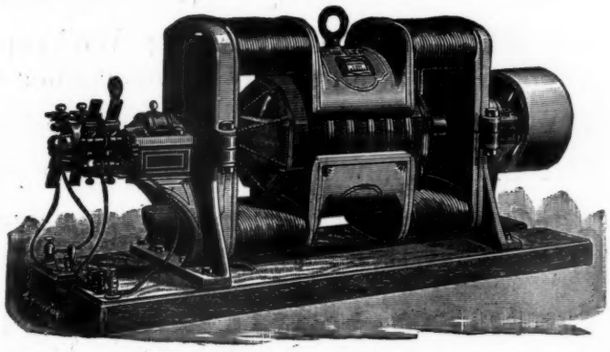

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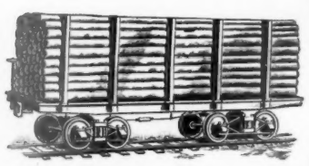

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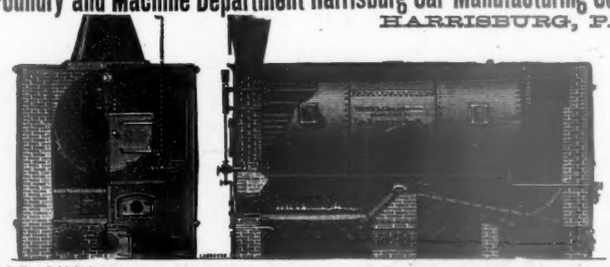

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"The Sawyer-Man lamps underwent the severest test during the last two months. They are the best and finest in the market. No other lamps could stand the heavy strain and vibration at the Fair building."—An Exhibitor at the American Institute Fair, 1889.

"We have lamps still burning that have been in use ever since we put in the plant."—Cowperthwait & Co., Brooklyn, N. Y.

"Our Sawyer-Man lamps have given remarkably good service, averaging over 1,500 hours, and with a good light."—G. H. Nichols & Co., Laurel Hill, L. I.

"We have lately been using your lamps, which give us better satisfaction than the ——— lamps in use heretofore."—West Point, Neb., Electric Light and Power Co.

"They give a splendid, white, well-distributed light."—Vancouver, B. C., Electric Illuminating Co.

"The average life of the lamps on our plant up to last June was 2,800 hours. Since September we have lost very few lamps, so that the average life is very much greater than this."—Dr. W. A. Drysdale, Philadelphia, Pa.

"We are highly pleased with the lamps, and think they will have much better life than the ——— make."—Hutchinson, Kan., Water, Light and Telephone Co.

"Some of the first lot of Sawyer-Man lamps, put in over two years ago, are still in use."—Saxton & Thompson, Troy, N. Y.

"The lamps furnished us under your contract have given excellent satisfaction. We have quite a number of lamps now in use and burning brightly, which have been in constant use, on an average of six hours per day, since January 2, 1888."—Portland Block, St. Paul, Minn., September, 1889.

"We consider them superior to the lamp furnished us by others."—Electric and Water Supply Co., Neillsville, Wis.

"One of the lamps has been burning since August 1, 1888, making 16 hours each day, and is still a good lamp. We think that as you make such a good lamp, you are entitled to have their merits acknowledged by those who are daily using them."—F. E. Coward & Co., Philadelphia, Pa.

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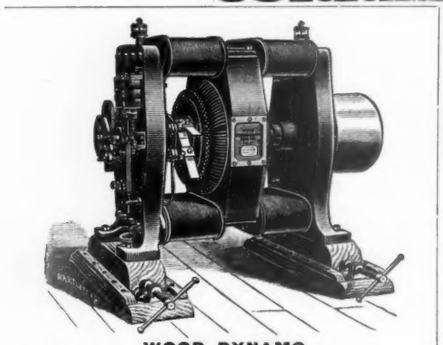

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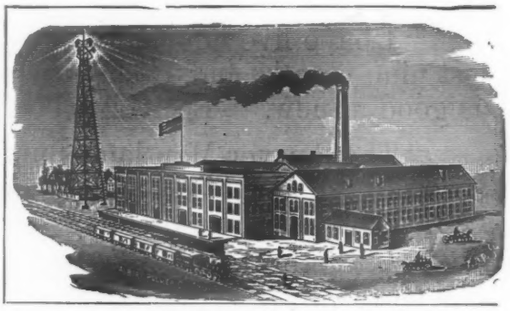

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